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AUTHOR Hoeppel, Frank C., Jr.
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ABSTRACT

A study was conducted to categorize the questions found in the reading skills development books used in Maryland's community colleges according to Bloom's Taxonomy of Educational Objectives. The study sought to determine the number of questions per taxonomy category; whether there was a significant difference between observed and expected frequency; and whether there was a significant difference among the categories. The study involved a survey of community college developmental reading programs, which revealed that 185 different skill development books were being used, and the selection of a sample of 555 questions from these books for analysis. Of the questions, 145 fell into the knowledge category of Bloom's Taxonomy, 400 into the comprehension category, 2 into the application category, and none in the categories of analysis, synthesis, and evaluation. This concentration of questions in the two lowest levels of thinking indicated that very little stimulation of the higher thinking processes was offered via the questions used in the reading skills development books used in the community colleges. The authors and publishers of these books, and the educators that use them need to become more concerned about the higher level thinking development of students, estimate the intellectual capabilities of these students at a higher level, and consider that reading material on a higher level may build reading motivation. (LAL)

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A TAXONOMICAL ANALYSIS OF QUESTIONS FOUND IN READING SKILLS DEVELOPMENT BOOKS USED IN MARYLAND COMMUNITY COLLEGE DEVELOPMENTAL/REMEDIAL READING PROGRAMS

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by

Frank C. Hoeppel, Jr.

submitted to the

Faculty of the College of Arts and Sciences
of the American University
in Partial Fulfillment of
The Requirements for the Degree
of
Doctor of Education
in
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Signature of Committee:

Chairman: _____

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Dean of the College

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1980

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DEDICATION

To Maureen and Chad,
my wife and son, and
my Mother and Father,
Frank and Sue.

ACKNOWLEDGEMENTS

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CHAPTER I

THE PROBLEM AND ITS SETTING

Introduction

In recent years the available supportive funds for many public agencies in the State of Maryland, particularly, the Community Colleges, have indicated a steady decline. The situation has prompted a scrutiny of some existing programs in these schools of higher education.[1] As a result, the Developmental/Remedial Programs have become questionable, particularly, in their effectiveness.[2]

Developmental/Remedial programs provide prerequisite college level instruction in specific subject areas and/or basic academic skills. However, these programs vary throughout the state for sundry reasons; the nature and size

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[1]Brent M. Johnson, "State Board of Community Colleges Plan Campus Discussions" (memo presented to Maryland Community College Presidents, Sept. 28, 1978), p. 5.

[2]Barbara Sanchez, comp., "About Community College Remedial and Developmental Education: A Brief Highlighting of Important Literature Since 1968 on Remedial and Developmental Education in the Community College" (Los Angeles, California: E.R.I.C. Clearinghouse, Aug., 1977), p. 2.

of the school population and an open admissions policy being major contributors. Such factors interfere with the collection of consolidated information, especially, the characteristics and effectiveness of Developmental/Remedial Programs.[3]

In general, Community College Developmental/Remedial Programs have been described as lacking in a number of areas and there is little conclusive evidence to support positive claims.[4] Conclusive research indicating superior or inferior teaching, counseling, remedial programs, governance, student welfare, and geographical accessibility is not in evidence.[5] In 1976 William Moore, Jr. pointed out that. . .

> Research is needed to determine the effects of instruction, teacher attitude, institutional climates, attendance, the materials and equipment used, and peer pressure on the achievement of high-risk students.[6]

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[3]Maryland State Board for Community Colleges, Developmental/Remedial Education: Statewide Assessment of Developmental/Remedial Education at Maryland Community Colleges (Annapolis, Maryland: Maryland State Board for Community Colleges, Sept., 1979), p. 2.

[4]William Moore, Jr., "Community College Response to the High Risk Student: A Critical Reappraisal," Horizon Issues Monograph Series (Los Angeles, California: E.R.I.C. Clearinghouse for Junior Colleges Information, 1976), p. 3.

[5]Ibid., pp. 41-43.

[6]Ibid., p. 41.

In September, 1979, the Maryland State Board for Community Colleges published the most recent data contributing to the understanding of Maryland Community College Developmental/Remedial Programs' characteristics and effectiveness. In the main, information pertaining to objectives, goals, student types, student numbers, direct costs, administrative organization, and effectiveness of Basic English courses was garnered.[7] However, much needed information must still be gathered in many specific areas as recommended by the formentioned study.[8]

One significant area of interest is Reading Skill Development and its effectiveness.[9] One sub-area of Reading Skill Development research that has gained recent attention is the type of materials used to teach reading skills. Recent reading material research at the community college level has

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[7]Ibid., Maryland State Board for Community Colleges, pp. 2-3.

[8]Ibid., pp. 63-64.

[9]Ibid., p. 1.

been conducted by Bertalan, Auvenshine, and Slovak.[10] Other studies, indicating a concern with reading materials, have been conducted at various levels of instruction. Knoll, Englehardt, and Habecker have inquired about the nature of reading comprehension questions in reading material, particularly, their cognitive levels.[11]

The primary concern of community college reading materials research has been text readability and student reading levels. This research has no contributive value toward understanding Devleopmental/Remedial Reading Program materials, since this

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[10]Anna Lee Banks Auvenshine, "A Study of the Readability of Junior and Community College Textbooks Used in the Academic Areas and the Reading Abilities of Students Using the Textbooks" (unpublished Ph.D. dissertation, Baylor University, 1978) 158 pp.; John J. Bertalan, "A Comparison of the Readability of Community College Social Science Textbooks with Student Reading Levels and the Effect of Academic Achievement" (unpublished Ph.D. dissertation, Florida Atlantic University, 1977), 147 pp.; Pauline Anderson Slovak, "The Reading Achievement Levels of Community College Freshman Enrolled in a Modular English Course Compared with the Readability Levels of Books Assigned in the Course" (unpublished Ph.D. dissertation, East Texas State University, 1975), p. 116.

[11]Patricia Morgan Knoll, "An Analysis of Comprehension Questions in Selected Elementary Supplementary Reading Materials According to the Barrett Taxonomy" (unpublished Ph.D. dissertation, University of Pittsburgh, 1978), 105 pp.; Leah Templeton Englehardt, "An Analysis of the Questions and Content in Selected Social Studies Textbooks for Use in the Intermediate Grades" (unpublished ED.D. dissertation, Southern Illinois University at Carbondale, 1978), 344 pp.; James Edward Habecker "An Analysis of Reading Questions in Basal Reading Series Based on Bloom's Taxonomy" (unpublished ED.D. dissertation, University of Pennsylvania, 1977).

research was conducted outside the realm of Developmental/Remedial Programs.

When this study was conducted, research dealing with the analysis of questions in reading skills development books used in Community College Developmental/Remedial Reading Programs was not apparent. The purpose of this study was to contribute this information.

Significance of the Study

A study that provides a cognitive level analysis of questions in reading skills development books may be valuable by:

1. Providing information that contributes to the understanding of Community College Developmental/Remedial Reading Programs' effectiveness. Since all these programs use reading skills development books, it is essential that a more clear understanding of the stimulants of thinking levels provided by quesitons be a part of the research literature. The effectiveness or ineffectiveness of the Community College Developmental/Remedial Reading Programs may be dependent on the cognitive levels of the questions asked of developmental/remedial students, since these questions are preparatory to success in academic endeavors.

The understanding of cognitive level development has been greatly influenced by the work of Jean Piaget. Piaget has developed four sub-divided stages of intellectual

capabilities. Inherent in each stage are certain intellectual potentials which manifest themselves by particular behaviors. These potentials are developed through interaction with the environment. The variety and degree of experiences determines the individual's growth within the confines of the particular stage. As the individual encounters environmental stimulation, intellectual manipulations can be modified. Lack of stimulation can negatively affect an individual's intellectual development by disallowing potentials to evolve.[12]

One form of intellectual or cognitive stimulation is the question. The intellectual or cognitive level of the question necessitates concomitant intellectual activity or thinking on the part of the questionee.[13]

2. Giving insight into the kind of cognitive level questions supplied by reading skills development books used in Maryland Community College Developmental/Remedial Reading Programs.

Piaget's work also indicates that individuals classified within the Formal Operation stage, the highest cognitive level, have attained potentials for the highest level of

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[12]G. A. Helmore, Piaget: A Practical Consideration (Elmsford, N.Y.: Pergamon Press, Inc., 1969), pp. 5-11.

[13]Thomas Andre, "On Productive Knowledge and Levels of Questions" (Ames, Iowa: Iowa State University, 1977), p. 8.

thinking. The potential for the highest thinking level exists for community college developmental/remedial students, barring mental disability.[14]

3. Furnishing information as to whether or not community college developmental/remedial students using reading skills development books engage in equal amounts of thinking stimulation at all cognitive levels.

As Moore states in his paper pertaining to high risk students:

> Reading is a sophisticated skill requiring cognitive operation. Although at first, learning to read may be procedural and mechanistic, the integration necessary to comprehend the printed word can be quite complex-calling upon a number of mental, physical, social, and emotional behaviors. The student must be able to follow instructions, add inflection to the printed word, recognize emotional tone, detect sarcasm, take direction from punctuation, extract inferences, understand plot, and utilize all other cognitive perceptual skills needed to interpret printed material.[15]

4. Alerting teachers to the import of cognitive levels of questioning in general,

5. Alerting teachers to the import of cognitive levels of questions in reading skills development books,

6. Alerting teachers to the import of cognitive levels of questions when constructing their criterion referenced materials and/or evaluations,

7. Providing a means to determine the cognitive levels

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[14]Ibid., Helmore, pp. 11-12.

[15]Ibid., Moore, p. 24.

of questions, when selecting reading skills development books and textbooks,

8. Furnishing information regarding the type and degree of supplementation needed to present a total and effective reading program,

9. Stimulating further research in the Community College community in particular regard to subject matter textbook question analysis,

10. Instigating inquiry about the levels of thinking required to be a successful college student and if they vary among subject areas.

Statement of the Problem

The purpose of this study was to categorize questions found in reading skills development books used in Maryland Community College Developmental Reading Programs via the Bloom Taxonomy of Educational Objectives: Cognitive Domain in order to determine:

1. the number of questions (observed frequencies) per taxonomy category,
2. whether there was a significant difference between the observed frequency and the expected frequency of questions per taxonomy category at the .01 level of significance.
3. whether there was a significant difference among the categories.

Research Questions

1. Is there a significant difference between the observed frequencies and the expected frequencies in the six categories?
2. If a significant difference is found in Research Question No. 1, where among the categories are the differences?

Assumptions

Instructors rely on reading skills development books to assist reading skills development.

The reading skills development books in this study were appropriate for teaching community college developmental/remedial students.

Bloom's Taxonomy of Educational Objectives is an accepted method of question analysis.

The questions in the reading skills development books in this study, as designed by the authors, were valid for their purpose.

Limitations

This study was restricted to those reading skills development books designated by a survey taken in June and July of 1979.

Although available, other taxonomies were not used for this study.

Vocabulary questions were not analyzed.

Questions when related to time or untimed, audio/visual or audio or visual presentations were not used. Likewise, questions appearing in teachers' manuals, textbooks for content area courses, and Reading Development Kits were eliminated from the study.

No attempt was made to compare the books from which the questions were selected.

The Definition of Terms

Bloom's Taxonomy of Educational Objectives-

A sequential, cumulative, classification system of the cognitive domain. In this case, the cognitive domain is divided into six intellectual operation levels of Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Each level represents a particular aspect of thinking and is dependent on the previous level for proper operation.[16]

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[16]Norman M. Sanders, Classroom Questions, What Kinds? (New York, NY: Harper and Row, 1966), p. 9; Janice I. Nicholson, "An Analysis of the Levels of Comprehension Required by Questions in Teachers' Manuals of Selected Basic Reading Textbooks" (unpublished Ed.D. dissertation, Mississippi State University, 1977), p. 7; Mildred C. Roebuck and John A. R. Wilson, Psychology of Reading: Foundations of Instruction (New York, NY: John Wiley and Sons, 1974), p. 39; Benjamin S. Bloom, ed., Taxonomy of Educational Objectives: The Classification of Educational Goals (New York, NY: David McKay Co, Inc., 1956), p. 4.

Knowledge - Those behaviors and test situations which emphasize the remembering, either by recognition or recall, of ideas, material, or phenomena.[17]

Comprehension - Those objectives, behaviors, or responses which represent an understanding of the literal message contained in the communication. In reaching such understanding, the student may change the communication in his mind to some parallel form more meaningful to him. There may also be responses which represent simple extensions beyond what is given in the communication itself.[18]

Application - The remembering and bringing to bear upon given material the appropriate generalizations and principles.[19]

Analysis - The breakdown of the material into its constituent parts and detection of the relationships of the parts and of the way they are organized.[20]

Synthesis - Putting together of elements and parts so as to form a whole. This is a process of working with elements, parts, etc., and combining them in such a way as to constitute a pattern of structure not clearly there

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[17]Benjamin S. Bloom, et al., p. 62.

[18]Ibid., p. 89.

[19]Ibid., p. 127.

[20]Ibid., p. 144.

before.[21]

Evaluation - The making of judgments about the value, for some purpose, of ideas, works, solutions, methods, materials, etc. It involves the use of criteria as well as standards for appraising the extent to which particulars are accurate, effective, economical, or staisfying. The judgments may be eicher quantitative or qualitative.[22]

Category

A group of objects all of which have the same distinctive features.[23]

Category Interrelationship

The meaning that a category does or does not have when compared to another category.[24]

Cognitive Domain

The area of human functioning which deals with recall or recognition of knowledge and the development of intellectual abilities and skills.[25]

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[21]Ibid., p. 162.

[22]Ibid., p. 185.

[23]Frank Smith, Comprehension and Learning (New York, NY: Holt, Rinehart and Winston, 1975), p. 243.

[24]Ibid., p. 17.

[25]Ibid., Benjamin S. Bloom, ed., Taxonomy of Educational Objectives: The Classification of Educational Goals, p. 7.

Cognitive Structure

A person's private theory of what the world is like and how it is organized based on previous experiences.[26]

Convergent Thinking

The selection, retrieval, and synthesizing of information to build the correct solution.[27]

Developmental/Remedial Programs

The policies, practices, programs, and courses designed to meet the needs of students entering an institution who, because of socio-economic and/or educational deprivation, physical handicap, or other reasons, lack the functional/academic skills considered necessary to do college-level work at that institution.[28]

Distinctive Features

One or some combination of properties that is unique to the objects that should be allocated to the particular

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[26]Ibid., Frank Smith, Comprehension and Learning, p. 16.

[27]Mildred C. Robeck and John A. R. Wilson, Psychology of Reading: Foundations of Instruction (New York, NY: John Wiley and Son, Inc., 1974), p. 140.

[28]Maryland State Board for Community Colleges, Developmental/Remedial Education: Statewide Assessment of Developmental/Remedial Education at Maryland Community Colleges (Annapolis, Maryland: maryland State Board for Community Colleges, September, 1979), p. 2.

categories and that serve to distinguish them from other objects that should not be alloocated to that category.[29]

Divergent Thinking

The transformation, combination, and treatment of details in unique ways to produce new information.[30]

Language Process

The deep structure composed of a fundamental set of units interrelated meaningfully by a number of rules analogus to cognitive structure. This is the process by which language is comprehended by the individual according to his theory of the world.[31]

Language Production

The surface structure or physical manifestations of language exhibited through sounds, word structures, and grammatical structures which lie wholly in the outside world of the individual.[32]

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[29]Ibid., Benjamin S. Bloom, ed., Taxonomy of Educational Objectives: The Classification of Educational Goals, p. 185.

[30]Ibid., Mildred C. Robeck and John A. R. Wilson, Psychology of Reading: Foundations of Instruction, p. 140.

[31]Ibid., Frank Smith, Comprehension and Learning, pp. 110-111.

[32]Ibid., p. 110.

Maturational Lag

A slowness in certain specialized aspects of neurological development.[33]

Reading Comprehension

The reduction of uncertainty about meaning -- the allocation of a visual configuration to one of an unknown number of alternative cognitive categories or structures.[34]

Question

Any reading evaluation or skill development presentation that necessitates a response by the reader for the purpose of improving reading skills. The following exemplify the variety and number of headings from which the questions population for the study were drawn: comprehension check, comprehension test, comprehension question, reading skills check, applications, thought questions, fact questions, study questions, activities, exercises, discussion questions, specific skill development questions, test lessons, and practice exercises.

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[33]Janet W. Lerner, Children With Learning Disabilities (New York, NY: Houghton-Mifflin Co, 1971), p. 240.

[34]Frank Smith, Understanding Reading: A Psycholinguistic Analysis of Reading and Learning To Read (New York, NY: Holt, Rinehart and Winston, Inc., 1971), p. 187.

Summary

The decline of supportive funds for Maryland Community Colleges has initiated an examination of existing programs. One major area of concern is the Developmental/Remedial Programs, especially, their effectiveness. The Maryland State Board for Community Colleges has posed many research possibilities to help determine the effective characteristics of these programs.

This study intended to examine the characteristics of questions found in reading skills development books used to assist reading instruction in Maryland Community College Developmental/Remedial Reading Programs according to Bloom's Taxonomy of Educational Objectives. Within the framework of certain limitations and assumptions, two research questions are stipulated: 1) Is there a significant difference between the observed and expected frequencies in each of the six taxonomy categories?, and 2) if a significant difference is found, where among the categories is the difference? A list of defined terms are included for the readers convenience.

CHAPTER II

THE REVIEW OF THE LITERATURE

Introduction

The organismic model of human development theory maintains that the organism and its environment are in continual action with each other, the organism being the active participant. This interaction permits the individual to become familiarized with the world through the senses.[1] Consequently, the individual gradually becomes cognizant of the surroundings and adapts to them by constructing a theory of the world and how to deal with it.[2] These sensory occurrences are the basis of future skill development and symbolic, linguistic, semantic, and associative processes; their accruance referred to as cognitive development.

A leading researcher and theorist of cognitive development is Jean Piaget.[3] Two aspects of his research are pertinent to the sequence and background of this chapter; namely, the "assimilation-accommodation" concept and a general idea of

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[1]Judith Steven-Long, Adult Life: Developmental Process (Palo Alto, Cal.: Mayfield Publishing Co., 1969), p. 51.

[2]Ibid., Frank Smith, Comprehension and Learning, p. 11.

[3]Ibid., Steven-Long, p. 57.

the "four stages of cognitive development." The review of literature will be further developed by explaining cognitive structure, categorization, comprehension, language and thought in relation to reading comprehension, questions and their analysis.

Cognitive Development

Piaget's Theory of Assimilation-Accommodation

Jean Piaget's theory of cognitive development or intellectual development has a biological basis. As the organism depends on its adaptation to the environment in a physical sense, so must it in an intellectual sense. The organism must take in nourishment in order to sustain physical development. For example, elements within ingested food are changed by the accepting organism. This process is called assimilation. The modifications that the accepting organism must make in relation to the type of nourishment is called accommodation. Hence, the body changes the substance and must also be ready for change in itself. After the processing is complete the body takes a status quo position until the next ingestion. This cycle is biological adaptation through the assimilation-accommodation processes.[4]

The same processes are applied when explaining cognitive

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[4]J. H. Flavell, The Developmental Psychology of Jean Piaget (New York, N.Y.: Van Nostrand-Reinhold, Ca. 1963), pp. 45-46.

or intellectual growth. The organism will continually make contact with its environment assimilating and accommodating those elements it is ready to accept. The continual interaction with the environment will establish that organism's picture or theory or understanding of the world.

These established orientations are referred to as schema or what the organism has absorbed to that point of its existence. The schemas are continually affected by future assimilations and accommodations which alter the schematic state. The schematic state is either at a point of equilibrium or assimilating and accommodating environmental stimulants. This process continues throughout the life cycle in various stages.[5]

Piaget's Stages of Cognitive Development

Piaget has established four major stages of cognitive development. Each stage is characterized by particular behaviors which manifest intellectual activity. These stages are hierarchical in nature.

The first stage is the sensori-motor stage. At birth the baby has only innate reflexes. Through the innate reflexes, the individual comes in contact with some aspect of its surroundings. For example, the baby may swing its arm and accidently hit the side of the crib. The baby may try it again and receiving the same response will tend to do it again

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[5]Ibid., pp. 46-50.

but not as a reflex action. The action now has meaning and direction; it has been internalized. Through its senses, the baby will gradually establish schemas which become more varied and complex via assimilation and accommodation.

This period extends from birth to eighteen-twenty-four months of age. During the latter half of this stage, imitation of persons in the immediate environment appears which extends into imagery development and the use of symbolism. The use of language begins during this latter half.[6]

The double-leveled pre-operational stage follows and extends from age two to seven. The first level or substage is the preconceptual sub-stage. The second level or sub-stage is the intuitive stage.

During the perceptual stage the use of symbols continues to develop. Imitation and imagery continue with advanced symbolic understanding, particularly, language development. However, preconceptual thinking dominates this sub-state which lies between the concept of an individual object and the general class of the object. The child cannot distinguish between the specific concept "dog" and the general concept "dogs." Inductive and deductive thinking do not exist as yet, so the child will argue that two dissimilar experiences are exactly the same. Symbols and objects are frequently confused. The child displays an egocentric attitude.

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[6]Ibid., G. A. Helmore, Piaget: A Practical Consideration, p. 8.

The second sub-stage, referred to as the intuitive stage, depicts the child's thinking as being able to consider one variable at a time and approach the understanding of an operation. The child has one point of view and cannot reason logically. However, as the child progresses through this sub-stage, it obtains the ability to coordinate different veiws and establish conservation of each view, the forerunner of logic.[7]

The third major stage, concrete operations, describes the development of logical thought in the child. The action in reality is replaced by imaginary actions called operations. The individual acquires the concepts of classification and seriation. Classification allows the child to include one class within another. From a group of mixed colored square blocks, the child can form a separate group of yellow square blocks. This is the essence of general to specific and specific to general though patterns. Seriation is the systematic ordering of sizes which underlies the concept of relationships between objects. The child does not possess the ability to deal with abstract thinking and can handle no more than two variables at a time.[8]

The major attribute procured during the fourth major stage, formal operations, is abstract thinking. The person

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[7]Ibid., pp. 9-10.

[8]Ibid., pp. 10-11.

no longer has to rely on what is present. The person can now hypothesize and make mental plans to solve problems; hypothetico-deductive thinking.[9] All individuals, barring any deficiencies, reach this highest intellectual plateau between the ages of eleven and fifteen years of age and is maintained through adolescence, early adulthood, and adulthood.[10] The intellectual processes begin to wane in late adulthood opposite to the manner in which they develop.[11]

The rate of growth within each stage or between stages is not necessarily consistent. A child with strong interest and motivations in a specific field may reach and extend beyond the plateau of a stage in that field but not so in other fields. An individual may be functioning at a particular level but possess the mental capability to perform at a higher level. In reading, for example, a late adolescent's skill development could be below expected level but still possess high level thinking capacities.

Categories, Attributes and Category Interrelations

The individual's understanding of the environment is aided by the ability to categorize. Various environmental aspects have common elements or attributes that permit grouping. The

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[9]Ruth M. Beard, Piaget's Developmental Psychology (New York, N.Y.: The New American Library, Inc., 1969), pp. 27-28.

[10]Ibid., Helmore, pp. 11-12.

[11]Ibid., Ruth M. Beard, pp. 28-29.

grouping of attributes contributes to the easy store of information.[12]

Attributes are combined in three ways; conjunctively, relationally, and disjunctively. A conjunctive category contains a specified combination of attributes. If an object has been categorized according to a specific size and shape, the same criteria must be present at the next confrontation if it is to be recognized as the same object and not something different. Conjunctive categories permit recognition. Relational categories contain one or some attributes that can be detected in another and different category which promotes efficiency of information gathering. A straight line can be seen in a square and a triangle. A disjunctive concept is recognized as the same phenomenon but contains a combination of different attributes. A strike as used in baseball terminology can be a ball pitched across the plate between the batter's knees and chest or it can be a pitched ball that is swung at and missed.[13]

There are two forms of categorization: perceptual and conceptual. Perceptual categorization refers to immediately available attributes and deals with the concrete. When an apple is seen it is immediately recognized as such due to its

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[12]Jerome S. Bruner, Jacqueline J. Goodnow, and George A. Austin, A Study of Thinking (New York, N.Y.: John Wiley & Son, Inc., 1958), pp. 8-10.

[13]Ibid., pp. 41-45.

discriminating attributes. The conceptual or abstract categorizing strategies demand a search of attributes in order that the attributes are correctly categorized or whether another category is warranted.[14] Perceptual concepts are the rudiments of recognition and recall, whereas conceptual concepts are basic to seeing and making relationships.[15]

Established categories have certain relationships. One category can be a subcategory of a category. A canary is a type of bird. The category canary is embedded within the broader category bird. The category bird is again categorized within the yet broader category vertebrate. This process is the formation of hierarchical structure.[16]

Depending on where a stimulus enters the subcategorical hierarchical structure, inductive or deductive thinking can result. As one descends from a more general to specific category, deductive thinking occurs. The opposite reaction is the nature of inductive reasoning or thinking.[17]

Another aspect of interclass categorization or "class inclusion relationships" is the relationships between less obvious attributes (depending on the society and/or culture).

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[14]Ibid., pp. 8-10.

[15]Francis P. Hunkins, Questioning Strategies and Techniques (Boston, Mass.: Allyn and Bacon, Inc., 1972), pp. 4-7.

[16]Ibid., Frank Smith, pp. 17-22.

[17]Ibid., Francis P. Hunkins, pp. 7-9.

Dogs and chairs are not as readily categorized as dogs and cats but then are related by the attribute of four legs. Departure from the obvious or more acceptable relationships is the basis for creative thinking. J. P. Guilford's term is "divergent thinking." When attributes are commonly combined, although members of separate categories, to form a generalization then "convergent thinking" takes place.[18]

Language and Thinking

With categories, and category interrelationships established, people can transfer their information via a communication system. This system, language, allows a person's experiences to be encoded into a socially and culturally accepted format. The format must be mutually acceptable to both the giver (encoder) and the receiver (decoder).[19]

After an approximate year form birth each individual acquires the ability to use symbols meaningfully to represent their world. This system, whether theoretically inherent, learned, or a combination of the two, is comprised of phonological, morphological, syntactical, and semantic

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[18]Janet W. Lerner, Children With Learning Disabilities New York, N.Y.: Houghton Mifflin, Co., 1971), pp. 212-213.

[19]James F. Kavanagh, The Genesis and Pathogenesis of Speech and Language (Bethesda, MD: Growth and Development Branch, National Institute of Child Health and Human Development, 1971), p. 234-235.

aspects. These four complex and vast mental and physical entities are grouped into two general categories: language processing and language production.[20]

Language processing includes semantics, syntax, and morphology. Language production is explained by phonological discrimination.[21]

Semantics refers to meaning or the person's knowledge of the world via attributes, categories and category interrelationships. This mental imagery is transformed or encoded according to syntactical or grammatical units which includes varieties of phrases, clauses, sentences, paragraphs, and paragraph interrelated structures. The position of words, whether oral or written, are governed by the syntactical rules of the language a person uses.[22]

Noam Chomsky, the originator of transformational grammar theory, suggests the syntactical capabilities of the human being to be basically inherited. He points out that the spontaneous and original generation of syntactical/semantic forms of one and two year old children are not mere imitations of previously encountered speech as one behavioral theory purports. The young child imitates those sounds and words in the environment but the countless variations of meaning

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[20]Ibid., Frank Smith, pp. 108-112.

[21]Ibid.

[22]Ibid.

represented by words within syntactical boundaries could not have been mastered in such a short life-span.[23]

Morphology, the third major component of language processing, is the study and/or analysis of words. The word is symbolic representation of thought which conveys meaning. Linguists classify words as either free or bound forms. The bound form is the grouping of word elements (spoken or written) which are consistent. The grouping of [r, u, n] will always represent the meaning or meanings attached to it. The free forms are those word elements which affect bound forms by modifying them. The word [run] is altered when the letter [s] is added to it. The letter [s] is a free form having adaptable qualities.[24]

The knowledge of the world symbolized through words in an acceptable linguistic format is language processing.

The language product is the extension of language processing into the environment through speech or writing. Phonology is the scientific study of word elements. Word elements, depending on a time mode or space mode, are the specific entities of a word. Spoken word elements are referred to as phonemes, the smallest derivation of a word. The written counterpart of a phoneme is a grapheme. The produced phonemic

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[23]Grover J. Whitehurst and Barry J. Zimmerman, The Functions of Language and Cognition (New York, NY: Academic Press, 1979), pp. 4-5.

[24]Ibid., Frank Smith, p. 86-87.

or graphemic elements combine in a meaningful and acceptable sequence to bring a person's thought out into the environment.[25]

Vysgotsky explains the process in the following manner:

> Verbal thought appeared as a complex, dynamic entity, and the relation of thought and word within it as a movement through a series of planes. Our analysis followed the process from the outermost to the innermost plane. In reality, the development of verbal thought takes the opposite course from the motive which engenders a thought into shaping of the thought, first in inner speech, then in meanings of words and finally words.[26]

Intellectual development gives a classification structure that makes the use of language a logical and analytical tool in thinking. A new situation can be incorporated into thinking. It gradually spreads to the older concepts as they are drawn into intellectual operations of a higher type.[27]

He continues by explaining that words are referents of a group or class of objects and each word a generalization.

> Generalization is a verbal act of thought and reflects reality in quite another way than sensation and perception reflect it. Such a qualitative difference is implied in the proposition that there is a dialectic leap not only between total absence of consciousness (in inanimate matter) and sensation but also between sensation and thought. There is

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[25] Ibid., pp 108-112.

[26] Leu S. Vysgotsky, Thought and Language (Cambridge, Mass: M.I.T. Press, 1962), p. 150.

[27] Ibid., pp. 1-8.

> every reason to suppose that the qualitative distinction between sensation and thought is the presence in the latter of a generalized reflection of reality, which is also the essence of word meaning is an act of thought in the full sense of the term. But at the same time, meaning is an inalienable part of words as such and thus belongs in the realm of language as much as in the realm of thought.[28]

Word meaning is both thought and speech. Semantic analysis permits the functioning and structure of word meaning to be understood.

Experiences must become generalized which is achieved through the development of word meaning. Higher levels of thought reflect conceptualized actuality. Generalization to a high enough degree is absent in children. Words become available after conception development.[29]

The development of thought occurs as social speech cnanges to egocentric speech and finally to innerspeech. This theory is opposite to Piaget's explanation of thought development which begins with nonverbal autistic thought and develops into egocentric thought and speech which becomes socialized speech and logical thinking.[30]

A person's store of information is referred to as the deep structure. When this information is structured according to the rules of a language it becomes part of the surface

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[28]Ibid., p. 31-32.

[29]Ibid., pp. 33-51.

[30]Ibid., pp. 19-20.

structure which can be communicated.[31]

The process of putting thoughts into language is encoding. The process of getting thought through language is decoding. A person encodes when time is taken to emit thinking in an oral or written manner. Decoding takes place when a person listens or reads.[32]

Reading Comprehension

Speech is the primary mode of encoding information since it is learned automatically and primarily in relation to its secondary counterpart, writing. Listening is the primary mode of decoding a message. The ability to listen is acquired before its counterpart, reading.[33]

Eleanor Gibson explains the relationship and development with the following diagram.[34]

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[31]Edward S. Klima, "How Alphabets Might Reflect Language" in Language By Ear and By Eye, ed by James F. Kavanagh and Ignatius G. Mattingly. (Cambridge, Mass.: M.I.T. Press, 1972), pp. 59-61.

[32]Franklin S. Cooper, "How Language Is Conveyed By Speech," in Language By Ear and By Eye, ed by James F. Kavanagh and Ignatius G. Mattingly (Cambridge, Mass.: M.I.T. Press, 1972), pp. 29-30.

[33]Kenneth S. Goodman, "The Psycholinguistic Nature of the Reading Process," in The Psycholinguistic Nature of the Reading Process, ed by Kenneth S. Goodman (Detroit, Mich.: Wayne State University Press. 1973), p. 18.

[34]Eleanor Gibson, "Reading for Some Purpose," in Language By Ear and By Eye, ed by James F. Kavanagh and Ignatius G. Mattingly (Cambridge, Mass.: M.I.T. Press, 1972), p. 9.

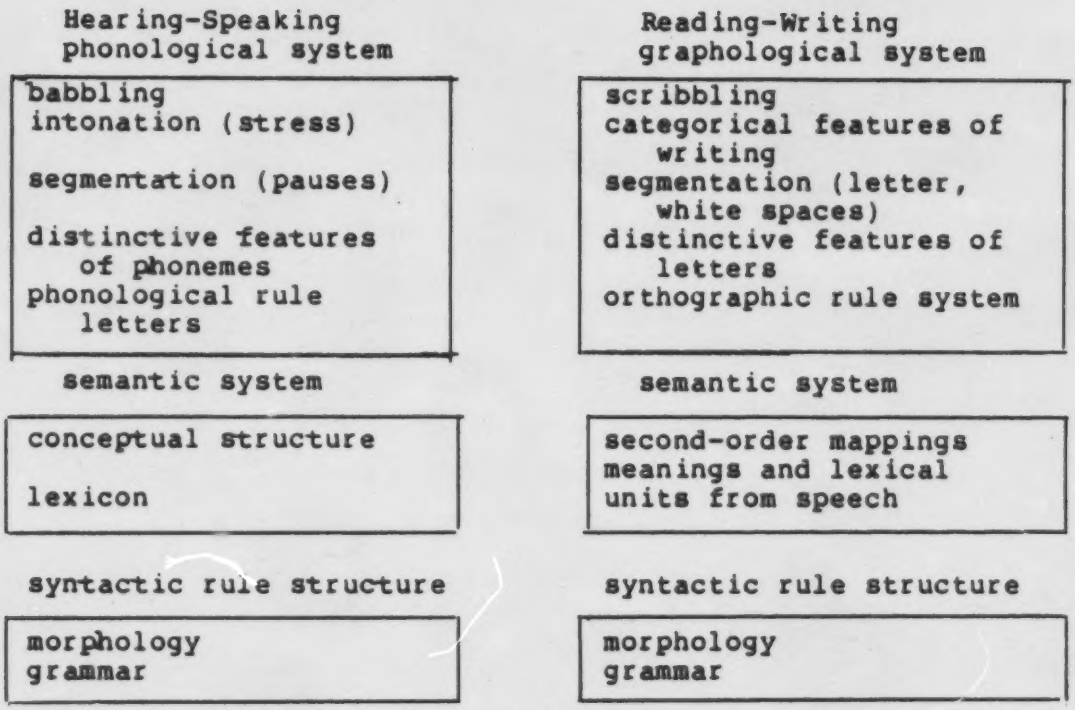

Figure 1. The Relationship and Development of the Primary and Secondary Modes of Communication

Reading, then, is a secondary decoding process which becomes more proficient with use, and physical and mental maturity. The young child is not as good a reader as an adult.

> The Reader converts characters into systematic phonemes; the child must learn to do so. The Reader knows the rules that relate one set of abstract entities to another; the child does not. The Reader is a decoder; the child must become one.[35]

Kenneth S. Goodman offers diagramatic explanations of reading process development. The following chart depicts the

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[35]Philip B. Gough, "One Second of Reading," in Language By Ear and By Eye, ed by James F. Kavanaugh and Ignatius G. Mattingly (Cambridge, Mass.: M.I.T. Press, 1972), p. 348.

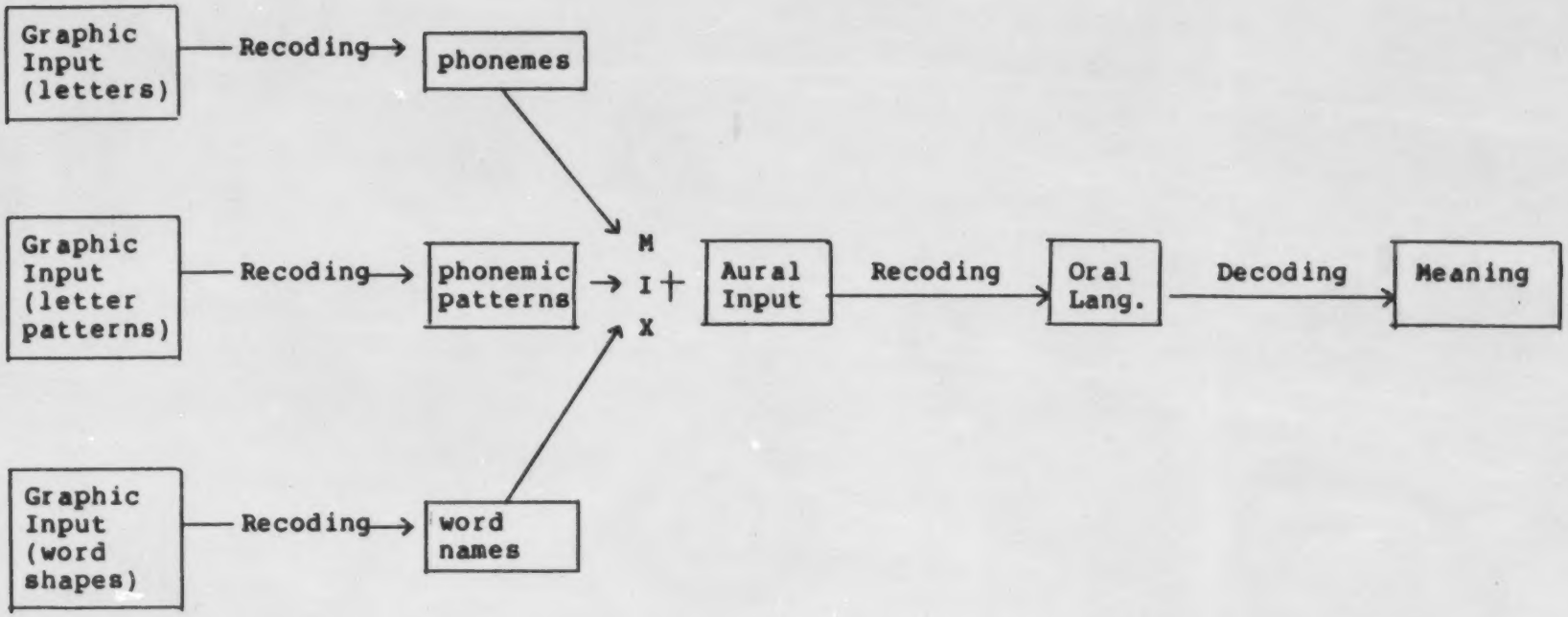

Figure 2. Proficiency Level I (The Beginning Reader)

beginning reader referred to as Proficiency Level I.[36]

The young child must convert the received graphemes into phonemic representations, repeat them orally and relate the results to previously acquired information.

The second stage is reached when the aural input is supplied by the reader simultaneously with his recoding of the graphic input.

> The reader must perceive letters and words always as parts of larger language units. He must be able to equate these large graphic units with oral phrases, sentences, and sentence sequences.[37]

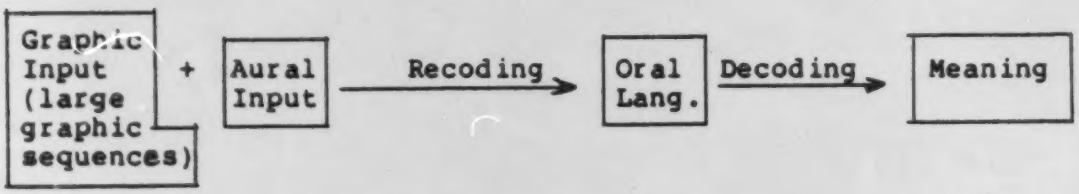

Figure 3. Proficiency Level II (The Young Reader)[38]

The final stage is reached when recoding and decoding become the same, except in complex passages. The reader decodes meaning directly from graphic input.

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[36]Ibid., Goodman, pp. 17-20.

[37]Ibid., p. 18.

[38]Ibid.

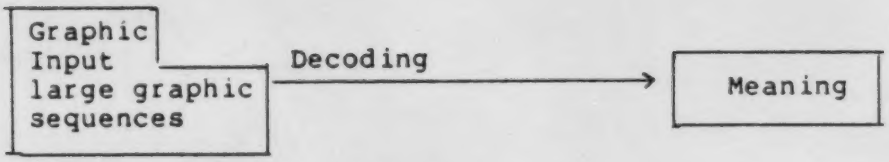

Figure 4. Proficiency Level III (The Reader)[39]

This psycholinguistic presentation of the reading process has been the most recent theoretical contribution toward the understanding of the reading process. The theory also suggests the reader to be a very active mental participant when comprehending. The reader supplies a good deal of information by itself. Information is supplied by the reader, for example, when the contextual setting permits word meaning or word pronunciation by guessing or predicting.

The guessing that takes place, however, is not blind. Previously learned semantic and linguistic knowledge demand particular events to occur. A predicate adjective or predicate nominative will always follow an intransitive verb. A word cannot end with the consonant cluster "cl." Most people in this culture can complete "It's a bird, it's a plane. No, it's _____."[40]

The psycholinguists have made a most innovative suggestion describing the reading process and reading

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[39]Ibid., p. 19.

[40]Kenneth S. Goodman, "Reading: A Psycholinguistic Guessing Game," in Theoretical Models and Processes of Reading, ed. by Harry Singer and Robert B. Ruddell (Newark, Del.: International Reading Assoc., 1976), pp. 497-508.

instruction since Chall's major work in the late 1960's. Chall's review of the research from 1912-1968 indicated that a "code-emphasis" method of beginning reading instruction was superior to a "meaning emphasis" (sight-word) method when reading comprehension was concerned.

Chall's research supported Flesch's contention that phonics was superior to all methods of reading instruction. However, Chall's view was more liberal than Flesch's since it suggests some type of code-emphasis method as opposed to only phonics.[41]

Psycholinguists refer to any form of word recognition, whether code emphasis or meaning emphasis, as recoding which permits the internal reestablishment of the aural or graphophonemic message. This recoding must then be decoded or related to meaning which may or may not be available to the receiver of the message. The ability to recode regardless of the method does not insure the completion of the message from one deep structure to another.[42]

However, this concern for getting meaning was not always the case.

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[41]Jeanne Chall, Learning to Read: The Great Debate (New York, NY: McGraw-Hill Book Co., 1967), pp. 305-310.

[42]Kenneth S. Goodman, "Behind the Eye: What Happens in Reading," in Theoretical Models and Processes in Reading, ed. by Harry Singer and Robert B. Ruddell (Newark, Del.: International Reading Assoc., 1976), p. 479-483.

The word comprehension in relation to reading was first coined in the mid nineteenth century. Up to that point reading comprehension was taken for granted. Emphasis was placed on oral reading. The Prussian influence of "simple to complex" was then being applied in America education. Attention was also given to getting meaning. Questions began to appear in the upper grade reading books. Silent reading began to replace oral reading.[43]

The influence of psychology was even greater at the end of the nineteenth and beginning of the twentieth centuries. The more psychology explained the working of the mind, the more silent reading became fashionable. Silent reading further instigated the need to know what people were understanding when they read. This put emphasis on questioning and test construction. By 1915, the first standardized reading test was devised. Classroom readers were designed with a generous amount of seat work and the children were to read silently, follow directions, answer true and false questions, and complete sentences as silent reading responses.

Through questioning and testing, it was found that not everyone comprehended tne same piece of writing in the same manner at the same or different levels. A close and large

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[43]Nila Barton Smith, American Reading Instruction (Newark, Del.: International Reading Assoc., 1965), pp. 81-86.

scale scrutiny of the reading process was initiated.[44]

William S. Gray presented his model of the reading process at the Annual Conference on Reading in 1958. His model consists of four major sequential divisions:[45]

I. Word Perception	- includes the identification and understanding of words.
II. Comprehension	- includes literal meanings, implied meanings, and significance of communication (purpose, assumptions, generalizations)
III. Reaction	- includes evaluation of what is read, the use of judgments, acceptance or rejection of message or critical reading.
IV. Fusion or Assimilation	- integration of read message with previous experiences.

This model is one of the foremost of its type and has influenced the development of various reading processing models, as well as models that attempt to explain more specific aspects of the reading process.[46]

Until this time, the 1960's, reading research lacked

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[44]Ibid., pp. 157-173.

[45]William S. Gray, "The Major Aspects of Reading," in Sequential Development of Reading Abilities, ed. by Helen M. Robinson (Proceeding of the Annual Conference on Reading Held at the University of Chicago, XXII, 1960), pp. 8-24.

[46]Harry Singer and Robert B. Ruddell, Theoretical Models and Processes of Reading (Newark, Del.: International Reading Assoc.), 1976.

the necessary scientific vigor it demanded. In 1954, C. Winfield Scott referred to research at that time to be "voluminous, fragmentary, and unrelated," "varied in quality and importance," and "inconclusive and limited."[47] Gray agreed with these criticisms.[48]

In 1962, the most thorough analysis of the reading process up to that time was performed by Jack Holmes and Harry Singer. The Substrata Factor theory analyzed both the power and speed of reading. Each subcategory or strata contributes a certain percentage toward successful completion. The number of substrata and the percentage of each varies with grade level.[49]

Cleland's analysis of the reading process includes a specific deliniation of comprehension skills.[50]

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[47]Ibid., Smith, p. 404.

[48]Ibid., p. 405.

[49]Harry Singer, "Substrata-Factor Patterns Accompanying Development in Power of Reading, Elementary through College Level," in Theoretical Models and Processes of Reading, ed. by Harry Singer and Robert Ruddell (Newark, Del.: International Reading Assoc., 1976), pp. 628-630.

[50]Helen M. Robinson, Sequential Development of Reading Abilities, (Proceedings of the Annual Conference in Reading Held at the University of Chicago, 1960).

I. Word Perception
   A. Identification
   B. Meaning

II. Comprehension
   A. Literal
      1. Details
      2. Main Idea
      3. Following Directions
      4. Sequence of Time, Place, and Events
      5. Identification of Stated Conclusions
   B. Implied
      1. Draw Inferences
      2. Character & Setting
      3. Relationships Among Events & Characters
      4. Cause and Effect
      5. Anticipate Outcomes
      6. Author's Purpose by Tone, Mood and Intent
      7. Comparisons and Contrasts
      8. Drawing Conclusions
      9. Generalizations

III. Reaction
   A. Intellectual Judgment
      1. Inquiring Attitude
      2. Validation
      3. Question Accuracy
      4. Establish Facts and Sound Principles
      5. Logical Reasoning to Note Omissions
   B. Emotional
      1. Value Judgments
         a. Recreate Sensory Images from Unusual or Picturesque Words

IV. Assimilation
      1. Revised Concepts
      2. Expanded Understandings
      3. Rational Attitudes
      4. New Insights
      5. New Ideas

Other reading comprehension level classifications were offered by Ruth Strang: 1) Literal Comprehension, 2)

Inference, and 3) Conclusion;[51] Andresen and Robinson: 1) Literal, 2) Interpretive, 3) Critical Reading, 4) Assimilation, 5) Creative Reading;[52] and Sparks and Jonnson: 1) Literal 2) Inference, 3) Conclusion, and 4) Critical Reading.[53]

Although nomenclature and number of levels may vary, all the systems depict a reading-thinking relationship and hierarchical sequence.

Robert Emans' presentation of thinking abilities and reading comprehension skills aids in seeing this necessary relationship by the chart on the following page.[54]

The reading-thinking process involves three steps: declaring purposes, reasoning while reading, and judging. Purposes set up questions that demand solutions. The reader proceeds and balances what he finds against his purposes, experiences, and knowledge. Judgment is an evaluative process

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[51]Jack B. Jones, Comprehension's The Name of the Game (Washington, D.C.: U.S. Dept. of Health, Education and Welfare, National Institute of Education, E.R.I.C., 1978), p. 3.

[52]Ibid., Learner, p. 219.

[53]Ibid., Jones, p. 5.

[54]Robert Emans, "Identifying Significant Reading Skill: In Grades Four Through Eight," in Reading: Seventy-Five Years of Progress, ed. by H. Allan Robinson (Chicago, IL: University of Chicago Press, 1966), p. 39.

	Reading Skills					
Thinking Abilities	Main Ideas	Supporting Details	Sequences	Conclu-sions	Predictors	Other Skills
Recognizes						
Reproduces						
Distinguishes						
Concludes						
Summarizes						
Generalizes						
Anticipates						
Relates						
Analyzes						
Synthesizes						
Classifies						
Organizes						
Infers						

Figure 5. Robert Eman's Thinking Abilities and Reading Comprehension Relationship Chart

by which the reader draws conclusions.[55]

The reader must think in order to comprehend. The reader must rely on those reading comprehenrion skills learned up to that point. Although a person has the ability to think i. other situations there is no guarantee that the same thinking abilities will be utilized when reading. The individual must be taught reading skills and the appropriate application if successful reading-thinking activities are to occur.

The learner absorbs information most readily when it can be immediately applied to previous knowledge. In order to minimize the chances of misapplication, learning should take place sequentially. The major proponent of sequential learning is Robert Gagne.

Gagne presents eight types of learning: 1) Signal Learning, 2) Stimulus Response Learning, 3) Chaining, 4) Verbal Association, 5) Discrimination Learning, 6) Concept Learning, 7) Rule Learning, 8) Problem Solving. If the learning task requires chaining, the person must already have the prerequisites of signal le.rning and stimulus-response. If not, the learner would not have the necessary previous information to bring to the new task, causing misunderstanding and confusion.[56]

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[55]Russell G. Stauffer, Teaching Reading As A Thinking Process (New York, NY: Harper & Row. Publishers, 1969), pp. 12-14.

[56]Robert M. Gagne, The Conditions of Learning (New York, NY: Holt, Rinehart and Winston, Inc., 1970), pp. 63-65.

Tasks to be learned when presented out of sequence can be a contributing factor of learning disabilities. Certain skills which are learned remain in isolation and hinders or prevents thought contiguity. These skills have been referred to as "splinter skills."[57]

When new concepts are easily unified with existing concepts, reading becomes more fluent, efficient, meaningful, and a pleasant means of communication. Proper sequence grants easy access between old and new knowledge. Confusion is practically eliminated.[58]

The forementioned reading models presented specific reading skills within levels of thought. Although the specific skills are not in a definite sequence, the general classifications are: 1) literal, 2) Inference or Implication, and 3) Critical Reading. In evidence is the simple to complex, the concrete to abstract. The simple or concrete always preceeding the more complex or abstract.

More explicit derivations and sequences are offered through the use of the taxonomy.

Taxonomies are designed for very finite analysis of

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[57]Newell Kephart, The Slow Learner In the Classroom (Columbus, OH: Charles E. Merrill Publishing Co., 1960), p. 64.

[58]Ralph W. Tyler, "The Importance of Sequence in Teaching Reading", in Sequential Development of Reading Abilities, ed. by Helen M. Robinson (Proceeding of the Annual Conference on Reading Held at the University of Chicago, 1960), pp. 3-8.

various subjects or skills. They are hierarchical in nature whereby the lower categoreis are subsumed by the higher categories. Each level or category is further divided into sequential subcategories.

The first and to this day the foremost taxonomy is Benjamin S. Bloom's Taxonomy of Educational Objective: Handbook 1, Cognitive Domain. It describes the six levels of mental activity and their componants. The six major divisions are: 1) Knowledge, 2) Comprehension, 3) Application, 4) Analysis, 5) Synthesis, and 6) Evaluation. A breakdown of each division can be found in Appendix C.[59]

This sequence of intellectual functioning was designed to assist in constructing curriculums by providing an organized framework from which goals, objectives, and materials be constructed. Learning would be enhanced since instruction coincided with intellectual functioning.[60]

In 1960, J. P. Guilford presented a three-dimensional model of the structure of the intellect. Each dimension, 1) Operations, 2) Contents, and 3) Products, was divided into hierarchical categories. Intellectual functioning was described as some interaction of categories from all three

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[59]Benjamin S. Bloom, ed., Taxonomy of Educational Objectives: Handbook 1, Cognitive Domain (New York, NY: David McKay Co., Inc., 1956), pp. 201-207.

[60]Ibid., pp. 10-13.

dimensions.[61]

The Bloom and Guilford taxomies were combined by Wolf, King, and Huck in 1968. The five intellectual activities that comprised Guilford's Operations dimension were combined with Bloom's six levels of thinking resulting in a two-way method of ordering knowledge.[62]

Thomas Barrett developed a taxonomy designed specifically for the analysis of reading comprehension levels based on Bloom's Taxonomy in 1968. It included: 1) Literal Comprehension, 2) Reorganization, 3) Inferential Comprehension, 4) Evaluation, and 5) Appreciation. Barrett included aspects of the affective domain, however.[63]

Since Bloom's taxonomy was developed to enhance instruction, many taxonomies have been designed to determine the thinking levels required by questions contained within the materials used. Sander's, Hunkin's, Davis and Tinsley's, Suchman's, and Ruddell's are examples.[64]

The question has long been used as a means to determine the quantity and quality of thought. The thought level of

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[61]J. P. Guilford, The Nature of Human Intelligence (New York, NY: McGraw-Hill Book Co., 1967), pp. 61-65.

[62]Janice I. Nicholson, "An Analysis of the Levels of Comprehension Required by Questions in Teacher's Manuals of Selected Basic Reading Textbooks" (unpublished Ed.D. dissertation, 1977), p. 10.

[63]Ibid.

[64]Ibid., pp. 10-12.

the question determines the thought level required by the questionee.[65]

In summary, reading comprehension can be explained as the satisfaction of an uncertainty, motivated through curiosity or interest, transmitted via a complex linguistic system which the sender (writer) and receiver (reader) must mutually understand in order to convey meaning from one deep structure to another.

Meaning contains various thinking levels which range from the simple to the complex.

The levels of thinking can be established and stimulated through questioning.[66]

Questions and Written Question Analysis Research

The question has been part of the education process at least since the time of Socrates. There is evidence of question use in all subject matter areas and at all levels of education. The question can and is used as a means of determining ones amount of knowledge and as a stimulator for

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[65]Robert B. Ruddell, "Developing Comprehension Abilities: Implications From Research For An Instructional Framework," in What Research Has to Say About Reading Instruction, ed. by Jay S. Samuels (Newark, Del: International Reading Assoc., 1978), pp. 109-120.

[66]Ibid.; Frank Smith, Understanding Reading, pp. 185-187; L.S. Vysgotsky, Thought and Language, p. vi.

higher levels of thinking.[67] This chapter section will be concerned with question level strategies, type, position, and the research indicating the thinking levels demanded by written questions in reading material.

Whether a question is presented orally or in written form, the fostered thinking level can be measured. Question levels are measured through taxonomies.

One of, if not, the most noteable question construction and analysis guides is that of Norris M. Sanders. He devised a taxonomy based on Bloom's Taxonomy of Educational Objectives. His taxonomy contains seven levels as follows:[68]

1. Memory:	The student recalls or recognizes information.
2. Translation:	The student changes information into a different symbolic form or language.
3. Interpretation:	The student discovers relationships among facts, generalizations, definitions, values, and skills.
4. Application:	The student solves a lifelike problem that requires the identification of the issue and the selection and use of appropriate generalizations and skills.

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[67] Francis P. Hunkins, Questioning Strategies and Techniques (Boston, Mass.: Allyn and Bacon, Inc., 1972), pp. 1-3.

[68] Norris M. Sanders, Classroom Questions: What Kinds? (New York, NY: Harper & Row, Publishers, 1966), p. 3.

5. Analysis:	The student solves a problem in the light of conscious knowledge of the parts and forms of thinking.
6. Synthesis:	The student solves a problem that requires original, creative thinking.
7. Evaluation:	The student makes a judgment of good or bad, right or wrong, according to standards he designates.

Sanders converted Bloom's knowledge category to memory to keep the category names consistent with the intellectual exercise level they stimulate. The categories of Translation and Interpretation are two aspects of Bloom's Comprehension category.[69]

Sander's motivation was based on the fulfillment of educational objectives which mentioned critical thinking but could not provide for its attainment. Too much emphasis, due to availability, was placed on memory and very little stimulation was provided for high thinking processes (critical thinking). The taxonomy and concomitant questions would hopefully fill the need. Since learning by doing was the educational vogue at that time, critical thinking practice would enhance critical thinking.[70]

Hilda Taba devised a system of three cognitive tasks. Concept Formation, Interpretation of Data, and Application of

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[69]Ibid., p. 2.

[70]Ibid., p. 5-8.

Principles. Within each cognitive task, a sequence of three questions were asked: "What?", "Why?", and "What Does It Mean."[71] Her theory states that questions have functions and thnrough proper planning, the questionee can be lead into higher levels of thought. Her question functions are:[72]

Focusing - a strategy used to initiate discussion or to refocus on an initial question. In a sense, a focusing question or response helps develop a mental set for verbal interaction.

Ignoring - a periodically experienced strategy - a question or response is not accepted. The rejection may result from such factions as time pressure or negative attitude toward an individual.

Controlling - a strategy whereby a single individual dominates the discussion, providing little opportunity for others to interact verbally. The teacher must control usually by asking personal judgment questions.

Receiving - a strategy by which a question or response is acknowledged but without any elaboration whatsoever. The response can be positive or negative, depending on vocal tone or facial expression. Repeating the question or saying "Right," e.g.

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[71]Ibid., Hunkins, pp. 92-94.

[72]Robert B. Ruddell, "Developing Comprehension Abilities: Implications from Research for an Instructional Framework," in What Research Has To Say About Reading Instruction, ed. by S. Jay Samuels (Newark, Del.: International Reading Association, 1978), pp. 109-120.

Extending - A strategy used to elicit additional information on the same subject and at the same comprehension level.

Clarifying - A strategy in which the question or response explains or redefines previous information. Clarifying differs from extending because the strategy encourages an individual to deal with a prior and unclear statement. Clarifying may also utilize questions designed to obtain information on the same subject at the same comprehension level "Can you explain your point again?"

Raising - A strategy categorized by an attempt to solicit additional information on the same subject but at a higher level of comprehension. It constitutes a shift upward from the factual to the interpretive level or from the interpretive to the appreciate level.

Taba also introduced the theory of "cognitive maps." These "maps" or "guides" consist of vertical and horizontal lines. The vertical lines represent a particular concept or category, trees e.g. The crossing horizontal lines represent leaps of information and understanding in reference to a question asked.[73] Being aware of the question level asked and its appropriate response could lead to a sequential development of thought through cognitive levels and also produce creative thinking.

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[73]Ibid., Hunkins, pp. 14-16.

Suchman developed a student participation inquiry strategy. Students pose four types or classes of questions: verification, experimentation, necessity, and synthesis. Verification questions are used to obtain data. Experimentation questions determine the consequences of verbally manipulated information gathered at the verification. Necessity determines the need for data peculiar to the situation. Synthesis determines the validity of ideas being considered in reference to prior questioning.

The four types of questions are asked about four types of data: Events, objects, conditions, and properties. Events are situations, objects are elements existing as part of the events, conditions refer to the state of the objects and properties are inalterable characteristics.

This strategy allows student employment rather than teacher guidance. The student must assume the responsibility for dealing with the information and decisions made about it. The student questions until questioning is no longer available. The situation can then be picked up by another student. The teacher encourages student questions by keeping the questioning situation open to the student.[74]

Hunkins combined Bloom's Taxonomy and Suchman's Inquiry Strategy and developed a strategy for student higher cognitive thought. The following is an account of steps in a lesson:[75]

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[74]Ibid., pp. 95-98.

[75]Ibid., Nicholson, p. 11.

1. Begin with questions designed to elicit knowledge responses in order to lay a foundation of knowledge
2. Comprehension questions follow after a knowledge base has been attained.
3. Next, students would engage in application questions.
4. Results of application questions would be discussed and analysis questions would follow.
5. Following analysis the next lesson would stress systhesis.
6. Evaluation questions would be posed after the students have expanded their understanding on the synthesis level.

Hunkins felt that questions should serve four functions; centering, expansion, distribution, and order. The centering function serves as a student's knowledge level determiner. Expansion allows time for the application of information and comprehension already possessed. Distribution is the stage that permits students question interaction. Order refers to the student's thoughts in terms of their own environment which entails classroom behavior, rules of conduct and rules of order. The final product is of themselves.[76]

An interaction inventory was designed by Davis and Tinsley entitled Teacher-Pupil Question Inventory. It was developed to analyze questions that interact between pupil and teacher. These questions have been categorized on nine levels, 1) Memory, 2) Translation, 3) Interpretation, 4)

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[76]Ibid., Hunkins, p. 78-89.

Application, 5) Analysis, 6) Synthesis, 7) Evaluation, 8) Affectivity, and 9) Procedural.[77]

Guszak applied question analysis to reading and developed the Reading Comprehension Question-Response Inventory. By combining reading authority's reading skills with models of thinking, he was able to determine the classification of reading skills as recognition, recall, translation, conjecture, explanation, and evaluation.

Recognition refers to finding something written in the text. Recall questions asks the student to demonstrate comprehension by recalling facts. Translation refers to an objective, part by part rendering of something read or the story in his own words, e.g. Conjecture require the "cognitive leap" as what might happen or what will happen next. Explanation are inference questions that must be supported by some rationale. The evaluation question deals with matters of value rather than fact or inference; they contain a judgment quality.[78]

Ruddell designed a reading skill competence-comprehension level classification system which protrays the reader's reading skills at a specific comprehension level. His design follows:

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[77]Ibid., Nicholson, p. 12.

[78]J. F. Guszak, "Teacher Questioning and Reading," The Reading Teacher, Vol. 21, (1967), pp. 227-234.

Skill Competencies	Comprehension Levels		
	Factual	Interpretation	Application
Details			
Sequence			
Cause & Effect			
Main Idea			
Predicting Outcomes			
Valuing			
Problem Solving			

Figure 6. Ruddell's Reading Skill Competence - Comprehension Level Classification Chart

Ruddell sees four of Taba's questioning strategies as significant for reading. The focus strategy determines mental set or a purpose for reading. Extending strategies account for gathering additional information on the same subject at the same comprehension level. Clarifying encourages returning to the text in the case of misreading. The raising strategy projects thinking to higher cognitive levels when reading. The reader could read for inferences beyond the literal understanding of the text.[79]

Although the relationship between thinking and reading has been thoroughly established, the research points out that questioning does not always meet established goals and

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[79]Ibid., Ruddell, pp. 109-120.

objectives. The development of critical thinking skills in general and critical reading skills are found in every curriculum but studies have shown that question levels within the classroom do not foster expected reading and thinking levels.[80]

Ruddell and Williams, and Guszak found that of the total number of teacher questions, seventy percent were in the lowest cognitive level.[81] Bartalome and others have found that the majority of questions only stimulate the knowledge and comprehension levels.[82]

Information pertaining to thinking stimulated by written questions has received less attention. In a bibliography constructed by Johnson and Wilen, one out of sixty-five titles mention written questions. The vast majority pertained to oral teacher questioning in the classroom. The studies extended from 1912-1972 with the majority of studies conducted in the 1960's and early 1970's.[83]

The written question, as a facilitator of thinking when

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[80]Paz I. Bartolome, "Teachers' Objectives and Questions in Primary Reading," The Reading Teacher, Vol. 23, No. 1, (October, 1969), pp. 27-33.

[81]Ibid., Guszak; Robert B. Ruddell and Arthur C. Williams, A Research Investigation of a Literary Teaching Model: Project DELTA (Washington, D.C.: Dept. of Health, Education, and Welfare, Office of Education, 1972).

[82]Ibid., Bartolome.

[83]James R. Jonnson and William W. Wilen, Questions and Questioning: Research Studies (Washington, D.C.: Dept. of Health, Education, and Welfare, E.R.I.C. ED099279, 1974).

reading has been studied in regard to position in text. According to Wiesendanger, et. al., some doubt remains in the efficacy of question position.

Weisendanger, et. al., surveyed twenty studies and found ten to agree and ten to disagree with the positive affects of question position in text. In agreement were Yoakan and Truby, 1926; Washburne, 1929; Distad, 1927; Holmes, 1931; Germane, 1921; Shones, 1960; Henderson, 1964; Ballard, 1965; Finche, 1968. In disagreement were Christensen and Stordahl, 1955; Snawly 1962; Bloomer and Hertzman, 1965; Rathkapt, 1966; Grant and Hall, 1967; Goredy, 1968; Frase, 1968; Chadwick, 1972; Mottley, 1972; and Brady, 1974. The more recent the research, the greater the tendency to disagree.

Weisendanger, et. al., found that better readers are less affected by question than poor readers. Good readers seem to incorporate questioning in their normal reading development. Good readers, however, do better with higher level questions; inference and critical analysis, e.g. Poor readers tend to do better with factual questions. They suggested research on student generated questions and the levels of the questions generated.[84]

Questions accompanying text are referred to as adjunct

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[84]Katherine D. Wiesendanger, et. al., A Summary of Studies Related to the Effect of Question Placement on Reading Comprehension (Washington, D.C.: Dept. of Health, Education, and Welfare, National Institute of Education; E.R.I.C., May, 1980).

questions and are found previous to (pre-questions), within (interspersed), or after (post-questions) text.

Between 1965 and 1972 both Rothkapt and Frase, separately, and each working with others concluded post questions to be of greater assistance to reading comprehension than pre-questions and interspersed questions. Their studies included varieties of question placement, number of questions, variations of text length, frequency of interspersed question, purpose of interspersed question, different readability levels and all grade levels including adults.[85]

They explained this phenomena by noting that prequestions and interspersed questions alert the reader but to the specific information necessary to answer the question posed. Post questions tend to broaden attentiveness by making the reader more alert to the entire passage.

> A subject who does not see a question before reading a passage must attend to all of the passage rather than to the limited amount of information needed to answer the question.[86]

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[85]Ernst Z. Rathkopf, "Structural Text Feature and the Control of Processes in Learning from Written Materials," in Language Comprehension and the Acquisition of Knowledge, ed. by John B. Carroll and Ray O. Freedle (Washington, D.C.: V. H. Winston and Sons, 1972), pp. 315-335; Lawrence T. Frase, "Maintenance and Control in the Acquisition of Knowledge from Written Materials," in Language Comprehension and the Acquisition of Knowledge, ed. by John B. Carroll and Ray O. Freedle (Washington, D.C.: V. H. Winston and Sons, 1972), pp. 337-357.

[86]Samuel Weintraub, "Research: The Question as an Aid in Reading," The Reading Teacher, Vol. 22, No. 8, (May, 1969), pp. 751-755.

A marriage of both types of questions, the general and the specific, would be ideal. If a change in presentation occurs, it is more likely to be seen in reading improvement books than the traditional textbook. Textbooks are not readily changed in accord with research, particularly format.[87]

Post-questions have been selected for analysis by this writer in this study. Post question formats are either objective or essay. The objective formats are either alternative-response, matching, completion, or multiple choice. The essay question calls for a composed written response by the student usually of a sentence or more.[88]

Question format guidelines have been established in order that thinking level and question format coincide. The completion question should measure facts, memory, not necessarily understanding. Alternative-response measures facts and memory as recognized and recalled by the students. Multiple choice measures inferential reasoning, understanding, sound judgment, and discrimination, if properly constructed. Matching measures association: mostly memory. The essay measures higher levels of knowledge, if properly constructed.[89]

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[87]Wendell W. Weaver and Albert J. Kingston, "Research for the Classroom," Journal of Reading, Vol. II, No. 2, (Nov., 1967), pp. 140-143.

[88]Ibid., Sanders, p. 165.

[89]Ralph Whitfield, Principles of Test Construction (Washington, D.C.: The American University, 1973), p. 1.

The proper question format is essential for stimulation and elicitation of thought. Objective questions can lead to thinking in all categories except synthesis and evaluation. Essay questions must be used for the full exploration of all categories.[90]

Studies providing written post-question analysis have been sparse. Early studies were provided by Nudelman, 1929; Mead, 1939; Lucas, 1941. They analyzed the cognitive level of textbook questions into reasoning or memory questions. There were more memory than reasoning questions but progress had been made toward the inclusion of reasoning questions.[91]

In 1955, Bailer analyzed 4267 questions taken from thirteen ninth grade literature texts and concluded that the texts studied failed, "to a considerable degree," to promote critical thinking.[92]

Reynolds, 1967, categorized 3,334 secondary general biology review questions via Bloom's Taxonomy. The most frequented category was knowledge, particularly specific facts. A "distant second" were the number of comprehension questions. "A varied balance between knowledge questions and

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[90]Ibid., Sanders, p. 165.

[91]U.S. Chaudhari, "The Role of Questions is Thinking and Learning from Text: A Research Prospective," Educational Technology (January, 1974), pp. 7-11.

[92]Bailer, Joseph Raymond, "Semiotic and the Promotion of Thought by Text Questions," Dissertation Abstracts International, Vol. 16, No. 5. (Nov. 1955), p. 909-910.

higher type review questions did not exist."[93]

Within a study that compared teacher questions with authors and basal reader guide book questions, Bartolome found that posed author questions tended to fall within the lower three categories of knowledge, comprehension and application. He stated that the accomplishment of student higher level questioning was not evident although widespread agreement of its significance was present in the literature.[94]

Chew, 1966 and Windley, 1966 have also determined a low number of higher level questions in text books. Most questions stimulated little more than memory.[95]

Davis and Hunkins taxonomically categorized 732 questions extracted from three, fifth grade social studies text books. Seventy-eight percent fell into the knowledge category. Thirteen percent were placed in the higher level thinking processes categories. Of all 732 questions, one was

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[93]John Carl Reynolds, "An Assessment of the Cognitive Content of Review Questions in Selected Secondary General Biology Textbooks," Dissertation Abstracts International, Vol. 26, No. 6, (Dec., 1967), p. 2916A.

[94]Paz Inabagon Bartolome, "Comparison of Questions and Objectives Listed in Basal Reader Guidebooks with those observed in Reading Lesson," Dissertation Abstracts International, Vol. 30, No. 1, (July, 1968), p. 183A.

[95]V. Crew, Social Science Generalizations in Selected Second Grade Textbooks (Doctoral Dissertation; Berkeley, Cal.: University of California, 1966); V. O. Windley, Levels of Cognition and Social Science Content in the Classroom (Doctoral Dissertation; Berkeley, Cal.: University of California, 1966); in "The Role of Questions in Thinking and Learning from Text: A Research Perspective," Educational Technology, by O. S. Chaudhari, (January, 1974), p. 8.

an analysis question, one was a synthesis question and two necessitated evaluation.[96]

Santos, after analyzing 3,213 reading questions from seven basal readers used in grades three through six prescribed by the Philippine Board on Textbooks, found an overemphasis on recall (knowledge) questions and a significant lack of evaluation questions. No equal emphasis was given to the six levels of thinking across books and grades.[97]

Wadleigh compared the questions found in 1956 and 1968 American History textbooks. The questions did not equally represent all the levels of Bloom's taxonomy. The text questions were predominantly knowledge and comprehension questions. The appearance of application and analysis questions were negligible. Evaluation questions were of "short supply." There was no significant change in question levels over a twelve year interval.[98]

In 1970, Cooke sampled 3,536 comprehension questions from a 60,000 question population taken from readers, teacher

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[96]O. L. Davis and Francis P. Hunkins, "Textbook Questions: What Thinking Processes Do They Foster?" Peabody Journal of Education, Vol. 44, (March, 1966), pp. 285-292.

[97]Natividad Alejandre Santos, "Provisions for Critical Reading in Philippine Board Readers: An Analysis of Reading Questions Based on a Classification Scheme of Cognitive Skill," Dissertation Abstracts International, Vol. 29, No. 10, (April, 1968), p. 3344A.

[98]Clarence B. Wadleigh, "Questions in American History Textbooks As Contributors to Development of Thinking Skills," (unpublished doctoral dissertation, Stanford University, May, 1969). Chapter Five.

manuals and workbooks of three current, widely used basal reading series. Using Barrett's Taxonomy he found 1,961 questions or 55% to be literal comprehension; 928 questions or 26% as inference; 348 questions or 10% as appreciation; 198 questions or 6% as organization and 103 questions or 3% as evaluation questions. Literal comprehension questions predominated across materials and grade levels.[99]

Schmidt selected four high school physics textbooks, two modern and two conventional, via the results of 475 teacher questionnaires. 4,345 questions were analyzed. The largest number of questions fell into the knowledge category. All the books examplified a paucity of higher cognitive level questions. The two modern textbooks did not contain a greater number of higher level questions.[100]

200 questions per Junior High State History textbooks revealed that 92.6% of the questions were found in the knowledge and comprehension categories of Bloom's Taxonomy by Withrow, 1971. 7.4% were categorized above these levels.[101]

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[99]Dean A. Cooke, "An Analysis of Reading Comprehension Questions in Basal Reading Series According to the Barrett Taxonomy," Dissertation Abstracts International, Vol. 30, No. 12, (June 1970), p. 6467A.

[100]Jerry Schmidt, "An Assessment of the Cognitive Content of Questions Contained in Selected High School Physics Textbooks," Dissertation Abstracts International, Vol. 32, No. 1-2, (July - August, 1971), pp. 677-678A.

[101]John R. Withrow, "An Analysis of the Levels of Cognitive Skills Required by the Textbook Questions in Selected State Histories,"(unpublished doctoral dissertation, University of Virginia, August, 1971).

Thirty-two primary level books of four different basal reading series were used for the acquisition of 27,321 comprehension questions. Higginbotham analyzed the questions and placed them in either a non-critical reading mode or a critical reading mode. The critical reading mode was comprised of the analysis, synthesis, and evaluation categories of Bloom's Taxonomy. The non-critical mode was composed of the knowledge, comprehension, and application. From the lowest to the highest basal reading series the critical reading questions ranged from four to thirty-seven percent. She concluded that these numbers were insufficient.[102]

Fourty-eight percent of the questions analyzed by Boone were found to be detail questions. He analyzed a 3,536 question sample taken from a 60,000 question population. The population was drawn from readers, teacher manuals and workbooks of three basal reading series. The percentage of questions per Barrett Taxonomy category are as follows:

Literal Comprehension	55%
Inferential Comprehension	26%
Appreciation	10%
Reorganization	6%
Evaluation	3%

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[102]Florrie Womble Higgenbotham, "An Analysis of Content and Methodology for Teaching Critical Reading Skills in Basal Series," (unpublished doctoral dissertation, University of Georgia, 1970).

The proportion of literal comprehension questions should be reduced.[103]

In 1972, Chaudhari classified 711 questions of the Natonalized Hindu Textsbooks of Madhya Pradesh. 51.48 percent were found to be at the memory level; 11.6 percent at the comprehension level; 10.04 within the application and analysis categories; and 2.10 at the synthesis and evaluation levels.[104]

Twenty percent of the questions found in each of thirty-four elementary studies textbooks were analyzed by Rogers using Bloom's Taxonomy in 1973. An analysis of 2,547 questions revealed the following:

Knowledge	36%
Comprehension	41%
Application	2%
Analysis	10%
Synthesis	3%
Evaluation	8%

When the questions were analyzed in reference to the three lower categories or the three higher categories, the results indicated a seventy-nine - twenty-one percent difference in favor of the lower categories. He concluded that questions

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[103]Stanley Malcolm Boone, "An Investigation of the Effect of Higher Level Questions in Reading Comprehension," Dissertation Abstracts International, Vol. 32, No. 7-8, (January-February, 1972), p. 4480A.

[104]Ibid., Chaudhari, p. 8-9.

should be more evenly distributed among the categories.[105]

When comparing ten "old" and ten "new" college level social studies texts, Isaf found the older texts to contain a majority of recall and comprehension questions but found a relatively even distribution of questions over the upper level of categories in the "new" books.[106]

Coney divided Bloom's taxonomy between the knowledge and comprehension levels naming them level one and level two respectively. When analyzing every question found in a chapter from third, fourth, and fifth grade social studies textbooks, she found two of the three series to have fifty percent of their questions in level one; the remainder in level two. One of the three series predominated level two.[107]

Using Guszak's five level taxonomy, Vaughn categorized 3621 questions taken from the first two, middle two, and last two stories in nine basal reader teacher editions representing grades one, four, and six. She found all levels to be

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[105]Ronald J. Rogers, "An Analysis of Instructional Questions in Social Studies Textbooks Prepared for Use in Grades Four, Five, and Six," Dissertation Abstract International, Vol. 34, No. 3-4, (Sept.-Oct., 1973), p. 1776A.

[106]Robert Salem Isaf, "An Analysis of Skill Development Exercises Appearing in "Old" and "New" Social Studies College Methods Textbooks," Dissertation Abstracts International, Vol. 35, No. 5, (November, 1974), p. 2798A.

[107]Anita Louise Coney, "A Comparison of the Levels of Questions As They Reflect the Promotion of Critical Reading - Thinking Skill in Three Third, Fourth, and Fifth Grade Social Studies Textbooks," (unpublished doctoral dissertation, University of Syracuse, 1974).

significant across grades, among the selected series and within selected grades.[108]

From fifty-four guidebooks of grade one, three, and five recent basal series, Rosecky determined detail questions emphasized. Literal understanding required by guided reading questions and discussion questions ranged from 49.3 percent to sixty percent among the grade levels.[109]

144 total lesson plans were selected from four different basal reading series in two different time frames. Seventy-two plans were chosen from the 1950-59 period and seventy-two lesson plans were chosen from the 1966-1975 period. 2,754 questions were classified from the 1950-59 period and 4,234 questions were classified from the 1966-1975 period by Habecker.

The total question analysis indicated application questions to be least emphasized. Knowledge questions were most emphasized. Seventy percent of the questions were either knowledge or comprehension questions.[110]

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[108]Millie Ann Vaughn, "An Analysis of Selected Basal Reader Teacher Editions to Determine the Extent of Inclusion and Explanation of the Levels of Questioning," (unpublished doctoral dissertation, Indiana State University, 1976).

[109]Marion Haslam Rosecky, "An Analysis of Questions and Activities Accompanying Narrative in Selected Basal Guidebooks and Teachers' Use of Guidebooks," Dissertation Abstracts International, Vol. 37, No. 11, (May, 1977), p. 6936A.

[110]J. E. Habecker, "An Analysis of Reading Questions in Basal Reading Series Based on Bloom's Taxonomy," Disertation Abstract International, Vol. 37, No. 9, (March, 1977), p. 5699A.

In 1978, Englehardt performed a content/question analysis of fourth, fifth, and sixth grade social studies textbooks published by six major book companies according to Bloom's Taxonomy. The 2,234 questions were categorized as follows:

Knowledge	614 questions (27.5%)
Comprehension	829 questions (37%)
Application	69 questions (3.1%)
Analysis	376 questions (16.8%)
Synthesis	111 questions (5.0%)
Evaluation	237 questions (10.6%)

Of tne three grade levels, comprehension was first in frequency followed by knowledge, analysis, evaluation, synthesis, and application. Comprehension ranked first or second in all six series.[111]

The S.R.A. Reading Laboratories 1b, 1c, 2a, 2b and 2c were chosen by Knoll for reading comprehension question analysis. These laboratories were chosen as a result of a questionnaire survey and literature review based on the most widely used supplementary reading materials. A sequential random sample determined the questions to be analyzed by Banett's Taxonomy.

Literal comprehension questions predominated at all

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[111]Leah Templeton Englehardt, "An Analysis of the Questions and Content in Selected Social Studies Textbooks for Use in the Intermediate Grades," Dissertation Abstracts International, Vol. 39, No. 4, (October, 1978), p. 2174A.

levels. Question difficulty increased with grade levels. A significant difference between labs was found at the literal, inferential, and evaluation levels.[112]

Nicholson found the majority of comprehension questions to be at the literal level when she classified discussion questions included in teacher's manuals that accompany selected fourth grade basic reading series.

Ninety questions were selected from each of four basic reading texts and were classified according to Barrett's Taxonomy. The low classification was literal comprehension. The high classification was the remaining categories.

Of the higher level, most questions were inferential. An insignificant number of questions were found beyond inference. There was a four to one ratio of low level questions between series.[113]

Mary Woodburn analyzed 4149 questions taken from first, second, and third grade basal reader teacher's guidebooks of twelve different basal reading series. She also analyzed 108 story selections. Using Bloom's Taxonomy she found the

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[112]Patricia Morgan Knoll, "An Analysis of Comprehension Questions in Selected Elementary Supplementary Reading Materials According to the Banett Taxonomy," Dissertation Abstracts International, Vol. 39, No. 3, (September, 1978), p. 1324A.

[113]Janice Nicholson, "An Analysis of the Levels of Comprehension Required by Questions in Teachers' Manuals of Selected Basic Reading Textbooks," Dissertation Abstracts International, Vol. 38, No. 7, (January, 1978), p. 3936A.

following:[114]

Questions	Percentage
Knowledge	61.6
Comprehension	24.5
Analysis	5.1
Synthesis	3.9
Evaluation	2.9
Application	1.9

Fifty percent of the questions analyzed were on a literal level in ten out of twelve series. Higher level questions increased in number as did grade in two series.

The studies relevant to written question analysis fall within two major classifications: textbooks and reading skill development books. Both classifications can be subdivided into grade levels. The following chart depicts the allocation of the studies per book type and grade level.

	Elem.	Jr. H.S.	Sen. H.	College
Textbook	10	3	3	1
Reading Materials	11	0	0	0

Figure 7. The Allocation of Textbooks and Reading Skills Development Written Question Analysis Studies by Grade Level

In general, the studies indicate an over emphasis on lower levels of thinking and a paucity of higher thinking level stimulation. Older studies were more concerned with textbook analysis; new studies with reading development

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[114]Mary Stuart Woodburn, "How Questioning Strategies Are Employed in Twelve Pasal Reader Series," Dissertation Abstract International, Vol. 40, No. 9, (March, 1980), p. 5013A.

materials. The elementary level has been given the most attention.

This study will add written question analysis information to the literature that is not available at this time.

Summary

Inherited biological activities in conjunction with the environment provides the basis for intellectual development. Intellectual development, enhanced by the storage of information about the world through categorization, enables thinking. Thinking takes place at various levels determined by innumerable category interrelations.

The ability to transfer ones idea of the world to another is performed through the complex symbolic system of language. An individual's mental picture is encoded, orally or graphically, by the transmitter and is decoded, aurally or visually, by the receiver with the prime purpose of clear communication or understanding.

Decoding a written message that successfully transfers ideas or theories of the world from person to person is reading comprehension. Reading comprehension depends on a mutual understanding of the language system, vocabulary, and experience. Reading comprehension must be learned.

The primary means of reading instruction is the question. The question provides a means of evaluating something that has been read and/or a guide for future reading.

Since thinking occurs at various levels of complexity, so must the question. A question asked at a particular level, provides thinking at that level.

Written questions found within written materials that are used in classrooms to teach reading skills or subject matter have been found to be lacking in higher cognitive processes. The majority of questions are at the lower thinking levels and most research has been conducted at the elementary level.

This study provides a question level analysis of reading skills development books used in Community College Developmental/Remedial reading programs in the state of Maryland.

CHAPTER III

METHODOLOGY AND DESIGN

The Materials

Reading skills development books fall under the general classification of textbook.[1] The textbook is the result of collaboration between an author, publisher, and editor. Once a demand is evident, the publisher seeks an author. The author provides the subject, information, and related application, while the publisher provides the necessary manpower, materials, format, and printing techniques to make a sellable product. The editor assists the author's final manuscript. The author chooses the skills to be printed and the manner of presentation.[2].

The reading skills development book may appear in any variety of formats, may include any number of questions in reference to any number of skills, may be written for any

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[1]Chandler B. Grannis, ed., What Happens in Book Publishing (New York, N.Y.: Columbia University Press, 1957), pp. 307-308.

[2]Ibid., pp. 318-321.

particular grade level, and may be a member of a series or a single entity. The diversity of content and format, due to the unique needs of different populations throughout the state,[3] was exemplified by a recent survey of reading skills development books taken in the Summer of 1979. (Appendix A).

Selection of the Materials

The materials analyzed in this study were selected via a telephone survey taken during June and July, 1979. A member of each reading department was asked to report the names of reading skills development books which they considered most essential, most representative, or most widely used to assist teaching reading skills. The response was given by telephone or written communication. All the Maryland Community College Reading Programs were represented.

A total population of 185 different books was obtained (Appendix A). Any book duplication was eliminated. The resultant book population represents those materials used in Maryland Community College Developmental/Remedial Reading programs at that specified time.

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[3]Ibid., Maryland State Board for Community Colleges, Developmental/Remedial Education, p. 1; Intra., p. 19.

Selection of the Questions

In order to establish a total question population all questions were extracted from each book. The questions in each book were assigned a number determined by page number and the sequential position of the question. The page number and the sequential position of the question was plotted on a form designed for each book (Appendix B).

Selection of the Sample Questions

After the total question population was determined, a sample question population of 555 was randomly selected from the total question population of 62,483 using a table of random numbers. Three questions were randomly sampled from each of the 185 books in order that each book be represented in the sample.[4] The total number of questions in each book acted as the numerical parameters used with the table of random numbers. If a book contained 500 questions, three sample questions were chosen within that range. As the total number of questions varied, so did the parameters.

The sample questions were indicated on the same form used for plotting the total population. The sample questions were

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[4]Merle W. Tate, Statistics In Education and Psychology: A First Course (London, England: Collier-Macmillan, Ltd., 1965), pp. 328-329.

circled. A sample population total of 555 questions was established by randomly selecting three questions from each book. The questions were categorized by this writer, according to The Taxonomy of Educational Objectives (Appendix C) with the assistance of Metfessel's, Michael's, and Kirsner's "Instrument of Bloom's Taxonomy for Writing Educational Objectives" (Appendix D), after a rater reliability factor of 96% agreement was established between this writer and Dr. Rosemary Wolfe, Ph.D.[5]

The Taxonomy of Educational Objectives was used to categorize the questions. It is an educational-logical-psychological classification system developed by Bloom and his associates.[6] It consists of six levels: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Each level contains elements peculiar to itself

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[5]Benjamin S. Bloom, ed. Taxonomy of Educational Objectives, Handbook I: Cognitive Domain (New York, N.Y.: David McKay Co., 1956), Appendix I; Newton Metfessel, William Michael, and Donald Kirsner, "Instrumentation of Bloom's and Krathwohl's Taxonomies for the Writing of Educational Objectives," Psychology in the Schools, VI, (July, 1969), pp. 227-231.

[6]Ibid., Leah Templeton Englehardt, "An Analysis of the Questions and Content in Selected Social Studies Textbooks for Use in the Intermediate Grades," p. 152.

and represent specific intellectual behaviors (Appendix C). As with all taxonomies the higher levels subsume the lower levels. Accordingly, any question categorized by use of the taxonomy was placed in the highest category. When selecting the appropriate level of a question, the context to which the questions related was considered.[7]

Previous studies have established both the hierarchical structure validity and the rater reliability of the Bloom Taxonomy. Both Ayer's factor analysis of a forty-item multiple choice test and Kroop, Stoker, and Bashaws' construction and validation of cognitive processes tests contribute to the Taxonomy's validity.[8,9] The reliability of Bloom's Taxonomy has been demonstrated through Baughman and Mayerhofers' study

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[7]Ibid., Norman M. Sanders, Classroom Questions, What Kinds?, pp. 8-9.

[8]Douglas Ayers, Justification Of Bloom's Taxonomy by Factor Analysis (Chicago, Ill.: American Educational Research Association, February, 1966).

[9]Russel P. Kroop, Howard W. Stoker, and W. L. Bashaw, "The Construction and Validation of Tests of the Cognative Processes as Described in the "Taxonomy of Educational Objectives", "Cooperative Research Project No. 2117 (Florida State University: Institute of Human Learning and Department of Educational Research and Testing, 1966).

wherein twenty-five people classified 306 questions with 84% agreement.[10] Stoker found that raters tended to agree and classify items congruent with the behaviors the items were intended to evoke.[11] Tyler found a 63-94% agreement between raters among 354 frames of programmed material.[12]

Metfessel's, Michael's and Kirsner's "Instrumentation of Bloom's and Krathwohl's Taxonomies For the Writing of Educational Objectives" was used solely as an aid for classifying questions. Originally this instrument was designed for constructing educational objectives but it has also been used for evaluation. The instrument is composed of three columns. The first column indicates the taxonomic classification according to Bloom's Taxonomy. The second column contains infinitives; the third column contains examples of direct objects or subject matter properties. The

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[10]Gerald D. Baughman, and Albert Mayrhofer, "Leadership Training Project: Final Report," Journal of Secondary Education, XL, (1965), pp. 369-372.

[11]Howard Stoker, "An Emerging Trend in Achievement Testing," Florida Journal of Educational Research, VII, (1965), pp. 128-134.

[12]Louise L. Tyler, "The Taxonomy of Educational Objectives: Cognitive Domain - Its Use in Evaluating Programmed Instruction," California Journal of Educational Research, XVII, (1966), pp. 26-32.

second and third columns can assist the analyzer in terms of clarity and speed of classification. Its use was strictly supplemental (Appendix D).

Question Analysis Reliability

Prior to the analysis of the study questions proper, a group of fifty questions were randomly selected from those not selected for the study and were categorized by two different individuals, this writer and Dr. Rosemary Wolfe, Ph.D.

Each analyzer placed each question in one of the six categories. Both analyzers agreed on forty-eight of fifty categorizations: disagreeing on two. The fifty questions, question agreement/disagreement, and percentage of agreement/disagreement is depicted by the following chart.

TABLE 1.

DEGREE OF RATER AGREEMENT/DISAGREEMENT

OF FIFTY QUESTIONS

Symbols

c - comprehension questions

k - knowledge questions

Question #	Rater I	Rater II	Agreement	Disagreement
1	c	c	+	
2	c	c	+	
3	k	k	+	
4	k	k	+	
5	c	k		-
6	c	c	+	
7	c	c	+	
8	c	c	+	
9	c	c	+	
10	c	c	+	
11	k	k	+	
12	c	c	+	
13	c	c	+	
14	c	c	+	
15	c	c	+	
16	c	c	+	
17	c	c	+	
18	c	c	+	
19	c	c	+	
20	c	c	+	
21	k	k	+	
22	c	c	+	
23	c	c	+	
24	k	k	+	

Question #	Rater I	Rater II	Agreement	Disagreement
25	k	k	+	
26	c	c	+	
27	c	c	+	
28	c	c	+	
29	c	c	+	
30	c	c	+	
31	c	c	+	
32	c	c	+	
33	c	c	+	
34	c	c	+	
35	c	c	+	
36	c	c	+	
37	c	c	+	
38	c	c	+	
39	c	c	+	
40	c	c	+	
41	c	c	+	
42	k	k	+	
43	k	k	+	
44	k	k	+	
45	k	k	+	
46	c	c	+	
47	k	k	+	
48	c	k		-
49	c	c	+	
50	c	c	+	
Totals: 50	c-39	c-37 k-11	48 k-13	2

Degree of Rater Agreement - 96% (48/50)

Degree of Rater Disagreement - 4% (2/50)

A satisfactory rater reliability factor of ninety-six percent was verified as the degree of agreement between the two raters. This factor of agreement established this writer as a competent analyzer for the study questions proper.

Statistical Analysis

Due to the nature of the distribution and data, univariate and nominal, a One-Sample Chi-Square Test with five degrees of freedom was used to statistically analyze the data.[13] A test for significance of difference between two proportions was performed between the two predominating categories of Knowledge and Comprehension.

Summary

A survey taken of Maryland Community College Developmental/Remedial Reading Programs indicated the use of a wide variety of reading skills development books. The survey revealed a total book population of 185 reading skill development books from which 555 questions were selected for analysis in this study.

The sample question population of 555 questions, three

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[13] J.P. Guilford and Benjamin Fructer, Fundamental Statistics in Psychology and Education (New York, N.Y.: McGraw-Hill, Inc., 1973) p. 197

questions from each book, were catergorized according to The Bloom Taxonomy of Educational Objectives, after the establishment of a satisfactory rater relibility factor. A 96 percent degree of agreement factor determined the reliability of categorization by this analyzer. A One-Sample Chi-Square Test with five degrees of freedom and the test for significance of diffrence between two proportions was used to answer the research questions posed in this study.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Introduction

The analysis of data presented in this chapter provides information that answers the research questions posed by this study.

1) Is there a significant difference between the observed frequencies and expected frequencies in the six categories?
2) If a significant difference is found in Research Question No 1, where among the categories are the differences?

The Data

A population of 62,483 questions was established from 185 reading skills development books. A survey of Maryland Community College Developmental/Remedial Reading Programs taken in June and July of 1979 determined the books from which the question population was drawn.

A random sample of 555 questions was taken from the question population. Three questions were randomly selected from each book in order that each book be represented. A

table of random numbers was used.[1]

Rater Reliability

A ninety-six percent rater reliability factor was determined as acceptable between two raters. Fifty questions were randomly selected from the question population after the 555 questions were randomly sampled for the study.

The fifty questions were categorized according to Bloom's Taxonomy of Educational Objectives by both analyzers. Agreement occurred on forty-eight of fifty questions establishing a ninety-six percent agreement factor. A ninety-six percent agreement justified an acceptable analysis of the 555 questions selected for the study by this writer.

Findings

The 555 randomly selected questions were categorized by this writer according to the Bloom Taxonomy of Educational Objectives. Each question was placed in the highest category as defined in chapter two of this study. The vast majority of questions were Comprehension; 408 of 555. The Knowledge category recieved 145 of the 555 questions; ranking second. Two questions were placed in the Application category. The three remaining categories of Analysis, Synthesis, and Evaluation accumulated no questions.

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[1]Merle W. Tate, Statistics in Education and Psychology (London, England: Collier Macmillan Ltd., 1965), p. 328.

The Comprehension category accounted for 73.51 percent of the total random sample. The Knowledge category accrued 26.12 percent of the remaining 26.49 percent of the questions. Thirty-seven hundreths was analyzed as Application questions. A zero percentage represented the categories of Analysis, Synthesis, and Evaluation.

A great deal of emphasis was placed on Comprehension questions with Knowledge questions appearing as a distant second. The frequencies and percentages of the remaining categories indicates a complete absence of questions that stimulate the higher thought processes: Analysis, Synthesis, and Evaluation as shown in Table 2.

TABLE 2

A FREQUENCY DISTRIBUTION OF 555 QUESTIONS ACCORDING TO BLOOM'S TAXONOMY OF EDUCATIONAL OBJECTIVES.

Category Level	Category Name	Question Frequency	Percentage of Total
1	Knowledge	145	26.12
2	Comprehension	408	73.51
3	Application	2	.37
4	Analysis	0	0
5	Synthesis	0	0
6	Evaluation	0	0

In order to determine whether a significant difference existed among the categories, a One Sample Chi-square Test with five degrees of freedom at the .01 level of significance was applied to the data.[2] A chi-square value of 1,668.87 was significantly different than the chi-sqare value of 15.09 as indicated in the Distribution of Chi-square Values table. The 15.09 figure had been computed as the determining value for five degrees of freedom at the .01 level of significance.[3] The answer to the first research question was "yes." There was a significant difference between the observed frequencies and the expected frequencies in the six categories. The data analysis is presented in Table 3. The Knowledge and Comprehension categories were overrepresented. The Application, Analysis, Synthesis, and Evaluation categories were underrepresented.

The answer to the second research question was readily answered by the obvious vast differences of the observed frequencies in each category.

The 145 observed frequencies in the Knowledge category, giving a proportion of .2612, were statistically compared to the 408 observed frequencies in the Comprehension category

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[2]Perry E. Jacobson, Introduction to Statisical Measures for the Social and Behavioral Sciences (Hillsdale, Il.: The Dreydon Press, 1976), pp. 156-162.

[3]Ibid., p.601.

TABLE 3

A CHI-SQUARE ANALYSIS OF 555 QUESTIONS

ACCORDING TO BLOOM'S TAXONOMY OF

EDUCATIONAL OBJECTIVES

TAXONOMY CATEGORY	Observed Frequencies	Expected Frequencies	Observed minus Expected Frequencies	Observed minus Exp. Freq. Squared
KNOWLEDGE	145	92.5	51.5	2,652.25
COMPREHENSION	408	92.5	315.5	99,540.25
APPLICATION	2	92.5	-89.5	8,010.25
ANALYSIS	0	92.5	-92.5	8,556.25
SYNTHESIS	0	92.5	-92.5	8,556.25
EVALUATION	0	92.5	-92.5	8,556.25
TOTAL	555	555	00.0	135,871.50

Chi-square = 1,668.87, df = 5, p .01

for a proportion of .7351, since they were the only categories represented with numerical data, except for two questions categorized as Application questions. A test for significance of difference between two proportions was used. A "z" value of -10.39 indicated a significant difference between the two proportions at the .05 level using a two tailed test.[4] Therefore, Comprehension questions were used more frequently than Knowledge questions: this being significant at the .05 level. The observed frequency difference between all the other categories was such that no statistical analysis was necessary.

Discussion of the Findings

The findings indicate a vast inequality of question type presentation in the reading skill development books used in this study. An equal distribution would have been represented by 92.5 questions per category. However, 145 questions categorized as Knowledge questions exceeded the expected limits by 52.5 questions. The 408 questions classified as Comprehension questions exceeded the expected limits of the Comprehension category by 315.50 questions. Oppositely, the two questions categorized as Application questions depict a shortage of 90.5 questions. The three remaining categories of Analysis, Synthesis, and Evaluation each received no

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[4]Ibid., Tate, pp. 257-259.

questions.

It is quite clear that the reading skill development books from which the questions were taken for this study do not offer an equal opportunity to develop all the intellectual skills presented in Bloom's Taxonomy, to the students who are attempting to increase their reading proficiencies.

Also apparent is the allocation of over 99% of the analyzed questions into the Taxonomy's two lowest cognitive levels while 73% of the 99% fall into the Comprehension category alone. Considering that the sample represents over 62,400 questions, a good deal of repetition must exist. An over abundance of the two lowest cognitive level questions indicates an over-emphasis of lower level thinking skills at the expense of stimulating higher levels of thinking when reading.

Summary

A statistical analysis of data was performed to answer the two research questions posed by this study. A significant difference was found among the six categories into which 555 questions were placed after analysis by the Bloom Taxonomy of Educational Objectives. The significant difference was shown by the use of a One Sample Chi-square Test with five degrees of freedom at the .01 level of significance.

The vast or miniscule differences between categories were apparent through the observation of observed frequencies. A

statistical analysis to indicate significant differences between categories was unwarranted. However, a test for significance of difference between two proportions was carried out between the Knowledge and Comprehension categories since they contained 26.12 percent and 73.51 percent of the questions, respectively, thus accounting for 99.63 percent of all the questions. A significant difference between the Knowledge and Comprehension categories was found.

The Application category contained .37 percent or the remainder of the questions. The three highest levels of thinking, represented by the Analysis, Synthesis, and Evaluation categories, were allotted no questions.

Reading skills development books used in Development/Reading Programs in the state of Maryland did not contain an equal number of questions per taxonomical category. As a consequence, the student's opportunity to be stimulated at all levels of thinking did not occur.

Since 99.63% of the analyzed sample of over 62,400 questions extracted from 185 reading skill development books were classified as either Knowledge or Comprehension, a good deal of skill presentation repetition must exist. 99.63% also points out an overemphasis of the two lowest cognitive levels of thinking at the expense of the higher levels of thinking when reading.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was initiated in order to contribute information about existing Developmental/Remedial Reading Programs in Maryland Community Colleges. This study examined the characteristics of questions found in reading skills development books used to assist reading instruction according to Bloom's Taxonomy of Educational Objectives. The Taxonomy is a guide which is used to evaluate the cognitive level of educational objectives and oral and written questions. It contains six hierarchial cognitive levels and was used to determine the cognitive or thinking levels of the questions analyzed in this study.

Two research questions were stipulated: 1) Is there a significant difference between the observed and expected frequencies in each of the six taxonomy categories? 2) If a significant difference is found, where among the categories is the difference?

In order to answer the two posed research questions, a survey was taken of Maryland Community College Developmental/Remedial Reading Programs. The survey revealed

a total reading skills development book population of 185, from which 62,483 questions were extracted.

A random sample of 555 questions was selected from the 62,483 question population. Three questions were randomly selected from each book, in order that each book be represented. These 555 questions were analyzed by this writer, after a rater reliability factor of 96% was established as a criterion for acceptability. Two Raters analyzed fifty randomly selected questions taken from the 62,483 question population after the random selection of the 555 questions for the study proper was performed. A 96% agreement factor was attained between the two raters, establishing this writer as a competent analyzer and rater.

The 555 questions were categorized according to the criterion of Bloom's Taxonomy of Educational Objectives (Appendix C). One hundred forty-five questions were classified as Knowledge questions; 408 questions were classified as Comprehension questions; 2 questions were categorized as Application questions; and no questions were classified as either, Analysis, Synthesis, or Evaluation questions. The number of observed frequencies (analyzed questions) in each category, progressing from lowest to highest cognitive levels, are as follows:

Knowledge	-	145
Comprehension	-	408
Application	-	2
Analysis	-	0
Synthesis	-	0
Evaluation	-	0

The findings indicated a significant difference between the observed frequencies and expected frequencies (the expected number of questions in each category based on an equal distribution of question according to chance) of each category by means of a One Sample Chi-square test at an .01 level of significance with five degrees of freedom, answering the first research question affirmatively.

The second research question was satisified by comparing the proportion of questions in each category. Obvious gross discrepancies among the categories made a statistical analysis unnecessary execpt for the existance of frequencies in The Knowledge and Comprehension categories. Although noticeably disparate, a test for significance of difference between two proportions was conducted and a "z" value of 10.39 indicated a significant difference at the .05 level using a two tailed test.

The findings indicate that reading skills development books used in Developmental/Remedial Reading Programs in the state of Maryland did not offer an equal number of questions per taxonomical category. As a consequence, the students' opportunity to be stimulated at all levels of thinking did not occur.

Since 99.63 percent of the analyzed sample of 62,483 questions extracted from 185 reading skills development books were classified as either Knowledge or Comprehension, a good deal of skill presentation repetition must exist. 99.63% also points out an overemphasis of the two lowest levels of thinking at the expense of higher thinking levels when reading.

Conclusions

The conclusions offered in this chapter section are based on the findings presented in Chapter IV of this study.

The reading skills development books, as represented by the analyzed question sample, used in this study did not present an equal amount of thinking stimulation for all cognitive levels when reading. The student not encountering equal thinking level stimulation would have to seek those omitted stimuli from other sources or do without them. In most cases, the student is unaware of thinking level attainment and accepts what is presented, unknowing of its shortcomings and its probably noncontributive developmental effects.

Seventy-three and one half percent of the questions analyzed fell into the Comprehension category indicating an emphasis on the development of that thinking level. Of the remaining percentage of questions, all but .37% were categorized as Knowledge questions. Not only was there an unequal amount of questions per category but practically no opportunity to think beyond the Comprehension level was

offered. If thinking development beyond the comprehension level through reading is considered necessary and desirable other reading skill development books than those used in this study must be sought out or developed.

The instructor must supply supplementary materials to enhance higher level intellectual growth. The extra burden of material analysis for proper selection may not occur due to unavailability of time or unawareness of analaysis procedures. The student may never receive the necessary supplementary materials needed to stimulate and develop higher thought when reading.

The great number of questions available from the book population of this study, representing only two levels of thinking, give reason to suspect reading skill development question repetition. This situation can be a contributing factor in making proper book selection an unnecessarily arduous and confusing task for the busy classroom instructor. A variety of materials to choose from is desirable but an over abundance could lead to frustration on the part of the selector.

The repetitive nature of question offerings that demand the same thinking level response may also heavily contribute distastful and dininterested attitudes of students toward reading. If that which is comprehended is not used in more intricate, involving, creative, and evaluative thinking, the purpose for understanding what is read loses its value. The

very reason for reading, to accumulate information and self enjoyment, can become a very sterile and meaningless idea.

Another conclusion that may be drawn from the over supply of Comprehension questions is that authors and publishers have designed these books to teach only comprehension reading skills. If so, 26% of the questions analyzed should not have been classified as Knowledge questions.

Another consideration warranted by the inordinate number of lower thinking level questions is the type of student to which the questions might be directed. Usually students using reading skill development books in community colleges are deficient in reading skill development. However, this reading skill development deficiency should not influence the exclusion of higher thinking level questions. The absence of these questions does nothing for the development of higher cognitive processes of students attending community colleges who possess the capability of higher cognitive level development.

Since reading retardation is closely related to learning disabled people, it is highly probable that a number of Developmental/Remedial students are learning disabled.[1] Harrower (1964) and Mulligan (1969) both indicate that ninety percent of high school droupouts project Developmental

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[1]Lester Mann, Libby Goodman, and J. Lee Wiederholt, The Learning Disabled Adolescent (Boston, MA.: Houghton Mifflin, Co., 1978), p. 161.

Learning Disabilities.[2] Those that survive and enter "open door" institutions are representatives of the ten to twenty percent of school attending adolescents/young adults with learning disabilities and find themselves in classes they cannot control because of inadequate placement test information.[3,4] Nonetheless, their oft time subtle and well hidden signs of disorganization, low self esteem, anger, fear, and frustration can be detected and attention given by caring and trained personnel.[5]

Many of the learning disabled have suffered and are suffering from "maturational lag," a slower than normal neurological maturation in certain areas of the brain. However, these people function perfectly in all other areas. Their intelligence is average or above average. Brutten,

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[2]John H. Meier, Developmental and Learning Disabilities (Baltimore, MD,: University Park Press, 1976), pp. 331-348.

[3]Judith Ehre Kranes, The Hidden Handicap (New York, NY.: Simon and Schuster, Inc., 1980), pp. 19-20.

[4]Ann Marie Zalewski, "Reading Programs in the Community Colleges of Maryland" (unpublished report, Howard Community College, Columbia, Md., 1979), p. 6.

[5]Sally Smith, No Easy Answers: Teaching the Learning Disabled Child (Cambridge, MA.: Winthrop Publishers, Inc., 1979), pp. 182-202.

Richardson, and Mangel (1973) point out that logical reasoning and abstract thinking do not develop until adolescence or young adulthood.[6]

Questions stimulating these higher level processes would be to their advantage at this time as opposed to earlier developmental periods. Significant cognitive changes take place normally throughout adolescence suggesting a continuous need for stimulating the higher level cognitive processes as discussed by Erickson, Bruner, Ausubel, and Piaget.[7]

Implications

The following implications of this study pertain to those authors and publishers of reading skill development books, instructors of courses utilizing these books, administrators and educators in community colleges who are associated with reading skills development texts or courses that utilize these texts. The implications are:

1. That there is little concern in tapping the full extent of the students' intellectual skills when learning to improve

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[6]Brutten, Richardson, and Mangel, "Compensatory Education and Early Adolescence." (unpublished research report, Stanford University, 1974)

[7]Sidney R. Miller, "Secondary Programming," in Learning Disabilities Handbook, ed. by David A. Sabatino (Dekalb, Il.: Northern Illinois University Press, 1976), pp. 322-324.

their reading abilities. The relatively few higher cognitive questions highlight the problem.

2. That the relatively few higher level thinking questions suggests the possible absence of knowledge about or use of cognitive analysis instruments, such as, Bloom's Taxonomy.

3. That there may be a low estimation of the intellectual capabilities of these students as evidenced by the concentration of questions at the two lowest thinking levels.

4. That a need to provide understanding of various cognitive level analysis instruments, such as, Bloom's Taxonomy may exist.

5. That students' motivations for reading development may be enhanced if given the opportunity to explore beyond just recall and comprehension questions.

6. That instructors, presently, have very little choice in selecting reading skill development books due to the overall similarity of the questions asked.

7. That instructors are unaware of the multiplicity of reading skill development books and are not properly trained in selecting the most appropriate books for the student population with which they are working.

8. That a serious deficit in the education provided by institutions of higher learning may exist if instructors are not made aware of various cognitive level analysis instruments, such as, Bloom's Taxonomy.

Recommendations

1. It is recommended that authors and publishers of reading skill development books used in community colleges give greater consideration to the inclusion of questions that stimulate the higher cognitive levels when reading. A more balanced representation of all cognitive level questions should be presented.

2. It is recommended that institutions of higher learning make the instructors and reading specialists aware of various cognitive level analysis instruments, such as, Bloom's Taxonomy.

3. It is recommended that a more specific analysis of the Knowledge and Comprehension questions be made, since Knowledge questions can be subcategorized as Knowledge of Specifics, Knowledge of Ways and Means of Dealing with Specifics, and Knowledge of Universals and Abstractions in a Field questions and Comprehension questions can be subcategorized as Translation, Interpretation, and Extrapolation questions.

4. It is recommended that studies be designed to analyze questions which appear in text books for academic subjects.

5. It is recommended that each reading skills development book present the types of cognitive level questions used and their percent of representation within the book.

APPENDIX A

An Alphabetical Listing, by Title, of Books Designed for the Development of Reading Skills Used in Maryland Community Colleges.

The Art of Efficient Reading - Spache and Berg - Macmillan
Basic Reading Skills - Monroe, Horsman and Gray - Scott, Foresman
Be A Better Reader (books 1-6) - Smith, N. B. - Prentice-Hall
Better Reading Book (books 1-3) - Simpson - S.R.A.
Breaking the Reading Barrier - Gilbert - Prentice-Hall
College Reader - Shirley, Ullman and Wedeen - G. P. Putnam's Sons
College Reading Skills - Probst - Kendall/Hunt
College Reading: Skills and Practice - Weinberg - Houghton Mifflin
Comprehension Skills Series - (Middle Level and Advanced Level of each) - Jamestown
Appreciation of literary Forms - Giroux and Williston
Drawing a Conclusion - Giroux
Isolating Details and Recalling Specific Facts - Giroux and Williston
Making An Inference - Giroux and Williston
Making a Judgment - Giroux and Twining
Recognizing Tone - Giroux and Williston
Retaining Concepts and Organizing Facts - Giroux and Williston
Understanding Characters - Giroux and Williston
Understanding the Main Idea - Giroux and Williston
College Reading and Study Skills - Wood, N. V. - Holt, Rinehart and Winston
Design for Good Reading - Schumaker, Schick and Schmidt - Harcourt, Brace and World

Efficient Reading (Form B) - Brown, J. I. - D.C. Heath and Company

Reading Competence - Reiter and Royce - Cambridge

Reading Comprehension - Ervin (book 4-10) - Educators Publishing Service

Reading the Content Fields (Social Studies, Advanced), Spargo and Harris - Jamestown

Reading: A Key to Academic Success - Carter and McGinnis - Wm. C. Brown

Reading for the Main Idea - Raygon - McGraw-Hill

Reading for Meaning (book 6-11) - Coleman and Jungblut - J. B. Lippincott

Reading for Power - Smith, Brownsward and Hanley - P.A.E.R.

Reading for Results - Flemming - Houghton-Mifflin

Reading for Significant Facts - Raygon - McGraw-Hill

Reading Improvement - Reiter and Burke - Cambridge

Reading Performance - Reiter and Cooper - Cambridge

Reading Power - Brown, J. J. - D. C. Heath

Reading Skills Handbook - Wiener and Bayerman - Houghton-Mifflin

Reading Skills for Successful Living - Joffe - Wadsworth

Reading Skills for Young Adults - Niles - Scott, Foresman

Reading Tactics (Books C-D-E-F) - Niles, ed. - Scott, Foresman

Reading the Textbook - Panes - Crowell

Selections from the Block (books 1-3) - Spargo, ed. - Jamestown

Selective Reading - Smith and Spargo - P.A.R.

Skills in Reading (books 1 and 2) - Somefield, ed. - Cambridge

66 Passages - Sack and Yourman - College Skills Center

Six-Way Paragraphs - Pauk - Jamestown

88 Passages to Develop Reading Comprehension - Gilmore, Sack and Yoarman - College Skills Center

Essential Skills Series (books 5-20) - Pauk - Jamestown

A Guide to Student Success - Gold, Rosenstock and Turner - Kendall/Hunt

Ideas Module - Inference Module - Conlin - Houghton-Mifflin

Idea Power for Reading Comprehension - Kolzow - Prentice-Hall

Improve Your Reading Ability - Hulman - Merrill

Increasing Reading Efficiency - Miller - Holt, Rinehart and Winston

Multiple Skills Series - Boning - Lowell and Lynwood, Ltd.

Level A (books 1-4)
" B "
" C "
" D "
" E "
" F "
" G "
" H "
" I "

The Now Student - Spargo - Jamestown

Opportunity for Skillful Reading - Joffe - Wadsworth

Probe - Glock, Bender and Dennis - Merrill

The Range of College Reading - Beringause and Lowenthal - Houghton Mifflin

Reading Achievement - Reiter - Cambridge

Reading Beyond Words - Adams and Spira - Holt, Rinehart and Winston

Specific Skills Series - Boning - Barnell-Loft, Ltd.

Drawing Conclusions (Books G-L)
Following Directions (")
Getting the Facts (")
Getting the Main Idea (")
Context Clues (")

Standard Test Lessons in Reading (Books A-F) - McCall-Crabbs - Teachers College Press, Columbia University

Successful Reading - Norman - Holt, Rinehart and Winston

Tactics in Reading (Book A and B) - Niles, ed. - Scott, Foresman

Tactics in Reading (Books I and III) - Niles, ed. - Scott, Foresman

Topics for the Restless - (books 1, 2, 3) - Spargo, ed. - Jamestown

Toward Reading Comprehension (Form 2) - Sherbourne - D.C. Heath

Why, What, How to Read - Slater - Random House

APPENDIX B

Example Total Comprehension Question Selection Sheet

Book Title: Multiple Skills Series--Book A-1

Ex. No.	Question No.	Ex. No.	Question No.
1	1-2-3-4	26	1-2-3-4
2	1-2-3-4	27	1-2-3-4
3	1-2-3-4	28	1-2-3-4
4	1-2-3-4	29	1-2-3-4
5	1-2-3-4	30	1-2-3-4
6	1-2-3-4	31	1-2-3-4
7	1-2-3-4	32	1-2-3-4
8	1-2-3-4	33	1-2-3-4
9	1-2-3-4	34	1-2-3-4
10	1-2-3-4	35	1-2-3-4
11	1-2-3-4	36	1-2-3-4
12	1-2-3-4	37	1-2-3-4
13	1-2-3-4	38	1-2-3-4
14	1-2-3-4	39	1-2-3-4
15	1-2-3-4	40	1-2-3-4
16	1-2-3-4	41	1-2-3-4
17	1-2-3-4	42	1-2-3-4
18	1-2-3-4	43	1-2-3-4
19	1-2-3-4	44	1-2-3-4
20	1-2-3-4	45	1-2-3-4
21	1-2-3-4	46	1-2-3-4
22	1-2-3-4	47	1-2-3-4
23	1-2-3-4	48	1-2-3-4
24	1-2-3-4	49	1-2-3-4
25	1-2-3-4	50	1-2-3-4

APPENDIX C

Condensed Version of the Taxonomy Of Educational Objectives: Cognitive Domain

1.00 Knowledge

Knowledge involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting.

1.10 Knowledge of Specifics

The recall of specific and isolable bits of information

1.11 Knowledge of Terminology

Knowledge of the referents for specific symbols (verbal and non-verbal)

1.12 Knowledge of Specific Facts

Knowledge of dates, events, persons, places, etc.

1.20 Knowledge of Ways and Means of Dealing with Specifics

Knowledge of the ways of organizing, studying, judging, and criticizing

1.21 Knowledge of Conventions

Knowledge of characteristic ways of treating and presenting ideas and phenomena

1.22 Knowledge of Trends and Sequences

Knowledge of the processes, directions, and movements of phenomena with respect to time

1.23 Knowledge of Classifications and Categories

Knowledge of the classes, sets, divisions, and arrangements which are regarded as fundamental for a given subject field, purpose, argument, or problem

1.24 Knowledge of Criteria

Knowledge of the criteria by which facts, principles, opinions, and conduct are tested or judged.

1.25 Knowledge of Methodology

Knowledge of the methods of inquiry, techniques, and procedures employed in a particular subject field as well as those employed in investigating particular problems and phenomena

1.30 Knowledge of the Universals and Abstractions in a Field

Knowledge of the major schemes and patterns by which phenomena and ideas are organized

1.31 Knowledge of Principles and Generalizations

Knowledge of particular abstractions which summarize observations of phenomena

1.32 Knowledge of Theories and Structures

Knowledge of the body of principles and generalizations together with their interrelations which present a clear, rounded, and systematic view of a complex phenomenon, problem, or field

2.00 Comprehension

This represents the lowest level of understanding. It refers to a type of understanding or apprehension such that the individual knows what is being communicated and can make use of the material or idea being communicated without necessarily relating it to other material or seeing its fullest implications.

2.10 Translation

Comprehension as evidence by the care and accuracy with which the communication is paraphrased or rendered from one language or form of communication to another

2.20 Interpretation

The explanation or summarization of a communication

2.30 Extrapolation

The extension of trends or tendencies beyond the given data to determine implications, consequences, corollaries, effects, etc., which are in accordance with the conditions described in the original communication

3.00 Application

The use of abstraction in particular and concrete situations. The abstractions may be in the form of general ideas, rules of procedure, or generalized methods. The abstractions may also be technical principles, ideas, and theories which must be remembered and applied.

4.00 Analysis

The breakdown of a communication into its consituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between the ideas expressed are made clear and explicit.

4.10 Analysis of Elements

Identification of the elements included in a communication

4.20 Analysis of Relationships

The connections and interactions between elements and parts of a communication

4.30 Analysis of Organizational Principles

The organization, systematic arrangement, and structure which hold the communication together

5.00 Synthesis

The putting together of elements and parts so as to form a whole. This involves the process of working with pieces, parts, elements, etc., and arranging and combining them in such a way as to consitute a pattern or structure not clearly there before.

5.10 Production of a Unique Communication

The development of a communication in which the writer or speaker attempts to convey ideas, feelings, and/or experiences to others.

5.20 Production of a Plan, or Proposed Set of Operations

The development of a plan of work or the proposal of a plan of operation

5.30 Derivation of a Set of Abstract Relations(Deductive or Inductive Reasoning)

The development of a set of abstract relations either to classify or explain particular data or phenomena, or the deduction of propositions and relations from a set of basic propositions or symbolic representations.

6.00 Evaluation

Judgements about the value of material and methods for given purposes. Quantitive and qualitative judgements about the extent to which material and methods satisfy criteria

6.10 Judgements in Terms of Internal Evidence

Evaluation of the accuracy of a communication from such evidence as logical accuracy, consistency, and other internal criteria

6.20 Judgements in Terms of External Criteria

Evaluation of Material with reference to selected or remembered criteria

APPENDIX D

Instrumentation of Bloom's Taxonomy For The Writing of Educational Objectives

Taxonomy Classification	KEY WORDS: Examples of Infinitives	KEY WORDS: Examples of Direct Objects
1.00 Knowledge		
1.10 Knowledge of Specifics		
1.11 Knowledge of Terminology	to define to distinguish, to acquire to identify, to recall, to recognize	vocabulary, terms, terminology, meaning(s), definitions, referents, elements
1.12 Knowledge of Specific Facts	to recall to recognize, to acquire, to identify	facts, factual information (sources, names, dates, events, person, places, time periods), properties, examples, phenomena
1.20 Knowledge of Ways and Means of Dealing with Specifics		
1.21 Knowledge of Conventions	to recall to identify, to recognize, to acquire	form(s), conventions, uses, usage, rules, ways, devices, symbols, representations, style(s), format(s)
1.22 Knowledge of Trends, Sequences	to recall to recognize to acquire identity	action(s), processes, movement(s), continuity, development(s), trend(s), sequence(s), causes, relationship(s), forces, influences

KEYWORDS

Taxonomy Classification	Examples of Infinitives	Examples of Direct Objects
1.23 Knowledge of Classifications and Categories	to recall, to recognize, to acquire, to identify	area(s), type(s), feature(s), class(es), set(s), division(s), arrangement(s), classification(s), category/categories
1.24 Knowledge of Criteria	to recall, to recognize, to acquire, to identify	criteria, basics, elements
1.25 Knowledge of Methodology	to recall, to recognize, to acquire, to identify	methods, techniques, approaches, uses, procedures treatments
1.30 Knowledge Universals and Abstractions in the Field		
1.31 Knowledge of Principles, Generalizations	to recall, to recognize, to acquire, to identify	principle(s), laws, generalization(s), propositon(s), fundamentals, principle elements, implication(s)
1.32 Knowledge of Theories and Structures	to recall to recognize to acquire, to identify	theories, bases, interrelations, structure(s), organization(s), formulation(s)
2.00 Comprehension		
2.10 Translation	to translate, to transform, to illustrate, to prepare, to read, to change, to represent, to rephrase, to restate, to give in own words	meaning(s), sample(s), abstractions, words, definitions, phrases, representations

KEYWORDS

Taxonomy Classification	Examples of Infinitives	Examples of Direct Objects
2.20 Interpretation	to interpret, to reorder, to rearrange, to differentiate, to distinguish, to make, to draw, to explain, to demonstrate	relevancies, methods, relationships, essentials, theories, abstractions, aspects, new view(s), qualifications, conclusions
2.30 Extrapolation	to estimate, to infer, to draw, to conclude, to predict, to differentiate, to determine, to extend, to interpolate, to extrapolate, to fill in	consequences, implications, conclusions, factors, meanings, ramifications, corollaries, effects, probabilities
3.00 Application	to apply, to generalize, to relate, to choose, to develop, to organize, to employ, to use, to transfer, to restructure, to classify	principles, laws conclusions, effects, methods, theories, abstractions, situations, generalizations, processes, phenomena, procedures
4.00 Analysis		
4.10 Analysis of Elements	to distinguish, to detect to identify, to classify, to discriminate, to recognize, to categorize, to deduce	elements, hypothesis/ hypotheses, conclusions, assumptions, statements (of fact), arguments, particulars, statements (of intent)

KEYWORDS

Taxonomy Classification	Examples of Infinitives	Examples of Direct Objects
4.20 Analysis of Relationships	to analyze, to contrast, to compare, to distinguish, to deduce	relationships, interrelations, relevance, relevancies, themes, evidence, fallacies, arguments, cause-effects, consistency/ consistencies, parts, ideas, assumptions
4.30 Analysis of Organizational Principles	to analyze, to distinguish, to detect, to deduce	form(s), pattern(s), purpose(s), point(s), of view(s), bias(es), techniques, structures, theme(s), arrangements, organization(s)
5.00 Synthesis		
5.10 Product of a Unique Communication	to write, to tell, to relate, to produce, to constitute, to transmit, to originate, to modify, to document	structure(s), work(s), pattern(s), design(s), products, effort(s), performance(s), communication(s), specifics, composition(s)
5.20 Production of a Plan, or Proposed Set of Operations	to propose, to plan, to produce, to design, to modify, to specify	plan(s), objectives, specification(s), schematics, means, operations, way(s), solution

KEYWORDS

Taxonomy Classification	Examples of Infinitives	Examples of Direct Objects
5.30 Derivation of a Set of Abstract Relation	to produce, to derive, to develop, to combine, to organize, to synthesize, to classify, to deduce, to develop to formulate, to modify	phenomena, taxonomies, concept(s), scheme(s), theories, ways, relationships, abstractions, generalizations, perceptions, discoveries, hypothesis/hypotheses
6.00 Evaluation		
6.10 Judgments in terms of Internal Evidence	to judge, to argue, to validate, to assess, to decide	accuracy/accuracies, consistency/consistencies, fallacies, reliability, flaws, errors, precision, exactness
6.20 Judgement in Terms of External Criteria	to judge, to argue, to consider, to compare, to contrast, to standardize, to approaise	ends, means, efficiency, economy, economies, utility, alternatives, courses of action, standards, theories, generalizations

APPENDIX E

Example Radom Sample Comprehension
Question Categorizeaion Chart

Book Title: Multiple Skills Series

Book No.

	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4	E1	E2	E3	E4	Total No.
Knowledge																					
Comprehension																					
Application																					
Analysis																					
Snythesis																					
Evaluation																					

Book Title: Multiple Skills Series (Con't)

Book No.

	F1	F2	F3	F4	G1	G2	G3	G4	H1	H2	H3	H4	I1	I2	I3	I4	Total No.
Knowledge																	
Comprehension																	
Application																	
Analysis																	
Synthesis																	
Evaluation																	

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ERIC Clearinghouse for Junior Colleges
8118 Math-Sciences Building
University of California
Los Angeles, California 90024
APR 6 1984